modern machine shop

WHAT'S NEW IN CERAMIC TOOLING
See Page 70

MAINTAINING NUMERICALLY CONTROLLED MACHINES
See Page 92

AUGUST 1958

Three Verson OBI presses installed in the manufacturing plant of D. Gottlieb & Co., a leading producer of amusement machines. The presses are used for a variety of punching, blanking, forming and bending operations on component parts. Capacity of each press is 90 tons; operating speed, 45 SPM.

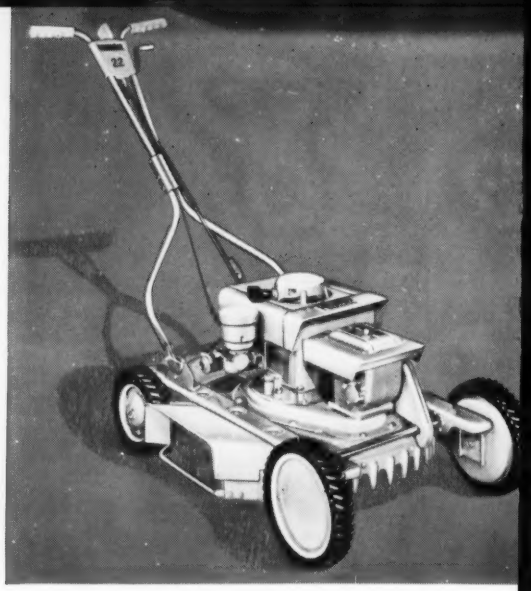
TRADE Verson MARK

VERSON ALLSTEEL PRESS COMPANY

CHICAGO and DALLAS

"Texaco helps keep our machining costs down, our output up..." says

Plant Superintendent Lawrence Hancock, Western Tool and Stamping Company, Des Moines, Iowa.



Homko Thunderbird—Western Tool and Stamping Company's *all steel swept-line* power mower—mows without pushing. Engine drives blade and front wheel. Modern equipment like this demands modern protection. *All* Western power mower bearings are factory-lubricated with Texaco.

"As the world's largest power mower producer, Western Tool and Stamping makes and sells 500,000 power mowers a year. There's no time for machine downtime. We get longer tool life, better finishes and fewer rejects with Texaco products," says Plant Superintendent Hancock.

Texaco Cutting, Grinding and Soluble Oils can improve your machining picture, too. Call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

PRODUCT	ADVANTAGES
Texaco Sultex Cutting Oil	assures longer tool life and better surface finish on hard-to-machine metals.
Texaco Soluble Oil	keeps grinding wheels and machining operations clean, remains stable in hard or soft water, allows dirt to settle out rapidly.
Texaco Regal Oil R&O	protects hydraulic circuits, prevents rust, sludge and foam.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(parts, inventory, production, downtime, maintenance)

For more data circle 302 on Postpaid Card

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modern machine shop

Published in the Machine Tool Capital of the World

Vol. 31, No. 3, August, 1958

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Published monthly and copyrighted (1958) by Gardner Publications, Inc., 431 Main St., Cincinnati 2, O.
Printed in U.S.A.
Accepted as controlled circulation publication at Cincinnati, Ohio.

modern machine shop

features in hi

Assembling & Finishing... Inspecting, Testing & Contro
Press Working... Management & Safe Practices... Mater
& Processes . . . Production Machining . . . Tooling & De

GUST 1

CERAMIC TOOLING—AID TO HIGH TEMPERATURE PROCESSING

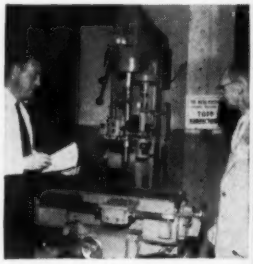
By Herbert Schwartz

The discussion covers in detail the uses and advantages of ceramic materials in producing tooling for high temperature work. Illustrations showing methods of producing ceramic tooling and typical parts made for high temperature work supplement the text.

Page 70

DEMONSTRATION AND DISPLAY FEATURES LATEST TOOLS AND EQUIPMENT

Machine and equipment display held recently by The Motch & Merryweather Machinery Company in its new Cleveland plant provided an opportunity for hundreds of production executives to see demonstrated more than sixty machine tools that have been designed to produce better workpieces.



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BUILDING LYCOMING ENGINES

By Edward J. Bertrand

Supervisor of Machining Bertrand continues his discussion of the different types of machining operations performed in producing various models of aircraft engines at the Lycoming Division of Avco Manufacturing Corporation. The concluding installment of this three-part series will be published in next month's issue.

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AUGUST 1958 • VOL. 31 • NO. 3

modern machine shop

NEWEST DEVELOPMENTS REVEALED AT COATED ABRASIVE MACHINERY SHOW

The importance of coated abrasives as a basic industrial tool was emphasized when 150 new abrasive machines were viewed and tested by several thousand industrial production men from the United States and foreign countries at the Third National Coated Abrasive Machinery Show sponsored by the Behr-Manning Company at its new $1,000,000 Product Engineering building in Troy, New York.

Page 86

HOW DOES A USER MAINTAIN COMPLEX NUMERICALLY CONTROLLED MACHINES?

By Gilbert C. Close

Here's a timely discussion of a critical problem you may be called upon to face in the not-to-distant future. A well-organized program for caring for complex numerically controlled machines is presented. Don't miss it!

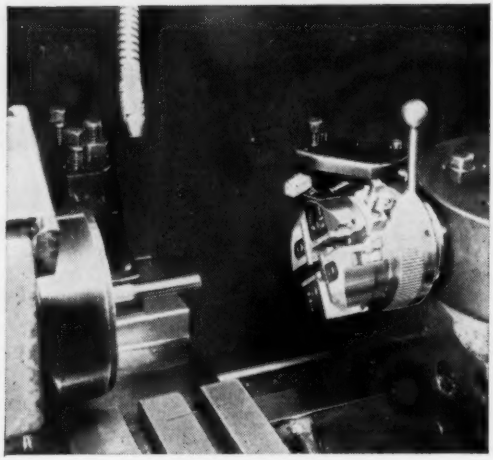
Page 92

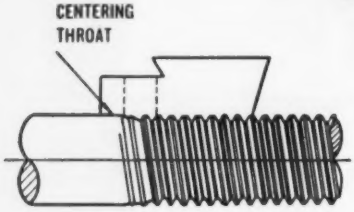
COMAPRO SPEARHEADS EFFORT TO ACHIEVE MORE PRODUCTION

COMAPRO — a word derived from COoperative MAchining PROject, an activity of Cone Automatic Machine Company, Inc., involving some seventeen manufacturers of machines, tools and equipment—is a thorough-going attempt, in considerable depth, to determine the best possible reproducible operating conditions for the multiple spindle bar automatic.

Page 102

Concentricity held to .002" between workpiece O.D. and thread with LANDIS Die Head





Centering Throat Chasers enabled the LANDMATIC Head to solve a difficult threading problem at the Minneapolis-Honeywell Regulator Co., Valve Division, in Philadelphia, Pa.

Threads on valve stems for diaphragm control valves were required to meet a concentricity tolerance of .002" total indicator reading. The 5HH LANDMATIC Hardened and Ground Head using Centering Throat Chasers is the only head tested capable of producing these results.

These Centering Throat Chasers are specifically designed for producing threads requiring a high degree of concentricity with the outside diameter of the workpiece. As indicated on the drawing, the centering throat section protrudes from the chaser cutting edge—to act as a work-aligning and work-supporting surface.

To produce these stems, 3/8" 24-pitch UNF threads are cut 1 5/8" long on 316 stainless steel at 30 SFM to Class 3 tolerances. Entire lots of 400 pieces are run without regrinding the chasers. LANDMATIC Hardened and Ground Heads are available in four sizes to thread all diameters from 3/16" to 2".

For additional information, please ask for Bulletin F-80. 475

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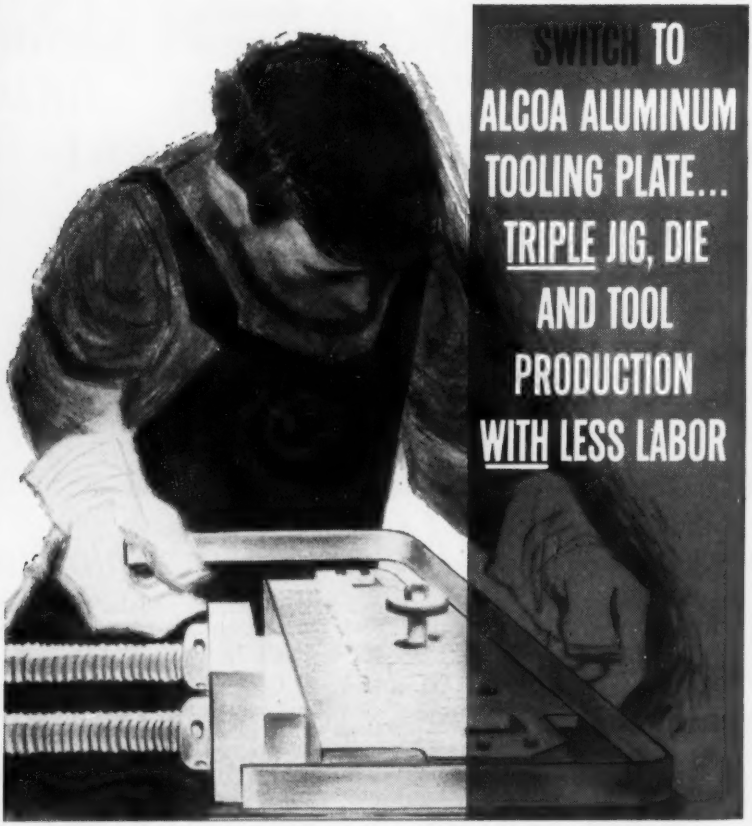

SWITCH TO ALCOA ALUMINUM TOOLING PLATE... TRIPLE JIG, DIE AND TOOL PRODUCTION WITH LESS LABOR

That's a mighty big order for any shop, but Alcoa® Aluminum Tooling Plate and Alcoa Tool and Jig Plate can fill it. Here's a case in point. You can make three times as many core blower plates from 100 pounds of Alcoa Tool and Jig Plate as compared to the number obtainable from 100 pounds of conventional tooling plate. Now add these other savings: aluminum machines three times faster with better accuracy . . . machines and tools last longer . . . less maintenance is required.

Slash Labor Costs as Much as 60 Per Cent. Along with aluminum's high-speed machining characteristics, you get all-important light weight for savings in handling. Because it weighs but one-third as much as iron or steel, changeovers are reduced to a one-man job. An aluminum jig takes less time and work to open, close, move, store or set up.

Call Your Local Alcoa Distributor. Order locally from a wide selection of sizes and gages, cast or rolled. Alcoa Tool and Jig Plate is ideal for high-precision tooling needs. Alcoa 6061-T6 Tooling Plate is a wrought aluminum plate for high-strength utility requirements.

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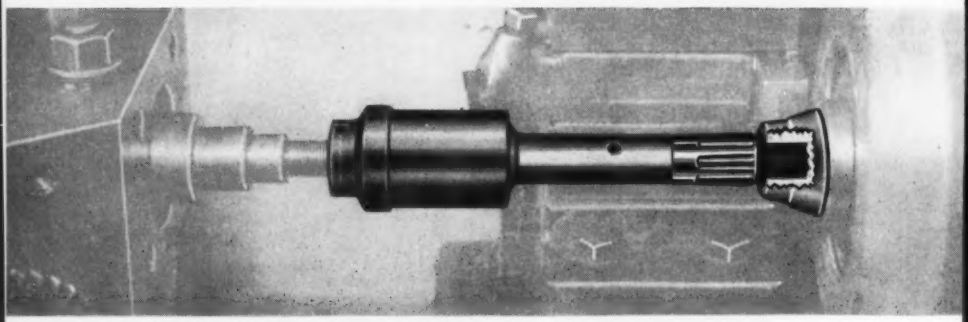
from 125 to 5 micro-inches *surfac finis*

in one 5-second pass!



with the revolutionary Microller burnishing too

- Finishes roughest bored or turned surfaces (ie: 200 mu-in. and higher) to finishes of 4 micro inches and lower.
- Finishes in one pass at feed rates of 8 to 12 inches per minute. A one inch length in 5 seconds!
- Finishes all machineable metals . . . all types of surfaces; internal and external cylindrical . . . tapered, radial, flat.
- Use tool in any machine . . . on any drill press, engine or turret lathe as a secondary operation . . . or right on the screw machine or automatic where other operations are performed! No special equipment needed.

ADJUSTABLE FOR SIZE CONTROL

- Sizes in increments of .000025" or less . . . performs sizing operations never before possible. Invaluable for sizing bearing seats, oilite bushings, parts out of tolerance, etc.
- Run thousands of parts without tool wear. No stones to replace. Highly hardened rolls and tip last for thousands of parts. Tool maintains size setting . . . no adjustment necessary. Wearing parts replaceable. Simplest setup and operation . . . no skill required.
- Stock shipment in popular sizes. Tools and replacement parts available from stock for off-the-shelf delivery.
- Refined, improved surface, a new concept. Tool marks and surface imperfections are rolled out. Grain structure is condensed and compacted . . . work hardened and refined; fatigue properties are improved. An ideal, wear-resistant surface results . . . free of damaging abrasive grit inherent in honing or grinding.
- The top twenty companies in the metal working field . . . plus more than a thousand others have replaced costly finishing and sizing methods with the Microller burnishing tool. In actual case histories, finishing costs have been cut by 90% . . . production rates increased by eight and nine times.
- Results guaranteed: The Microller is backed by Madison-Faessler's 80 years of experience in producing cold rolling tools . . . and is sold on a results guaranteed basis. Sales and service representatives in all principal cities.
- *Write for further information.*

(Affiliated with Madison Industries)

MADISON-FAESSLER TOOL CO.

235 N. Fifth St., Moberly, Mo., Dept. M.S.

it's mainly a matter of TIMING!

But how do you really KNOW when a machine has reached retirement age?

Any machine tool could be made to last *forever* – if you kept on maintaining and repairing it forever. In fact, if you put enough money into its maintenance, you could keep it "good as new" indefinitely. But there's an economic limit to the maintenance money you can spend. And there also comes a time when "good as new" is no longer *good enough!*

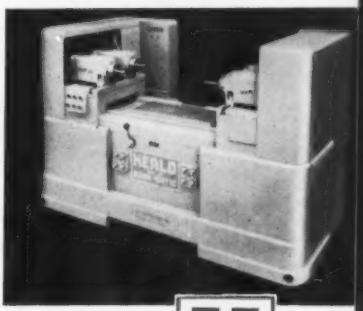
But, from the standpoint of production cost and return on investment, there *is* a mathematically predictable retirement age for any machine. Replacing it before this time is a waste of money. Retaining it *beyond* this time means a financial *loss* – often a substantial one!

Don't trust guesswork or rule-of-thumb computations to give you the right answer. There's too much money at stake.

Our sales engineers are well experienced in precise methods of replacement analysis. If you're in doubt – or would like to check your own figures – just call in your Heald engineer. He will be glad to help you. Similar obsolescence studies have effected many important savings.

For example: A diesel engine manufacturer asked for a replacement analysis on a 10-year-old boring machine, used to finish the I.D. of cam roller followers. It was found that a Model 322 Bore-Matic, like that shown at the right, would do the same job *50% faster*, with the following annual savings in operating cost:

	Old Machine	New Heald
Parts per hour	187	280
Parts per year (Req'd. Prod.)	374,000	374,000
Direct & Indirect Labor	$17,820	$9,400
Annual Maintenance	$750	$200
Annual Operating Cost	$18,570	$9,600
Annual Saving for New Machine		**$8,970**



YOU pay for obsolescence. Replacement pays for itself!

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

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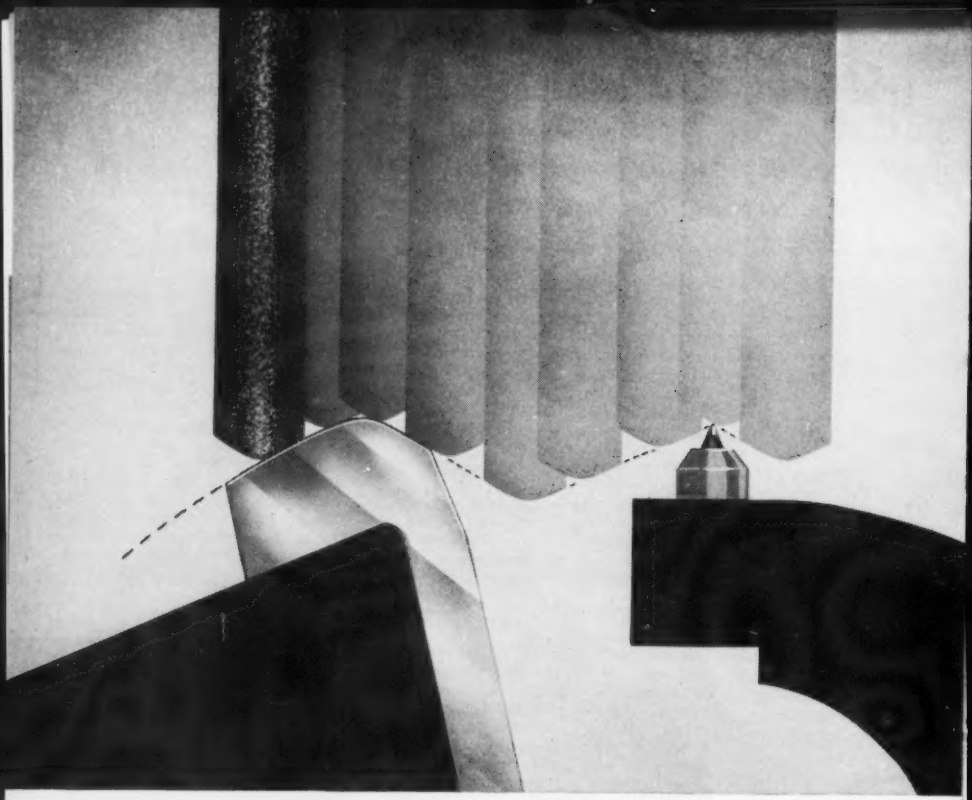
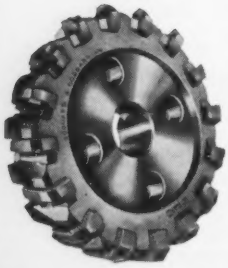


Oliver AUTOMATIC Face Mill Grinder

Wheel dressed with every stroke



Oliver face mill grinders are made in four sizes to accommodate cutters from 4" to 21" diameter.

The drawing above shows the grinding wheel passing over a cutter tooth after being dressed and formed automatically by a fixed diamond. This happens with each stroke of the Oliver automatic face mill grinder. Thus, complete accuracy of grind is certain regardless of the number of teeth in the cutter. This exclusive Oliver of Adrian feature prevents loading of the wheel and also permits carbide grinding with a silicon carbide wheel. Automatic feed-down accurately compensates for each dressing thus providing a fixed grinding line.

The machine automatically indexes the cutter and controls the tooth shape by a simple cam arrangement so that any practical roughing or finishing form can be obtained. The machine grinds the corner angle, corner radius, face and dish all in one operation. Oliver's face mill grinder is hydraulically operated for smooth, fast (4 to 8 times faster per cutter), accurate and quiet performance.

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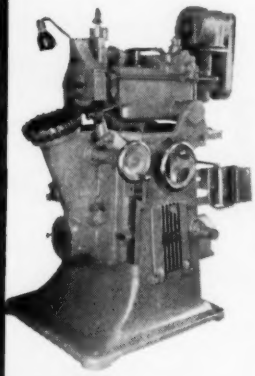
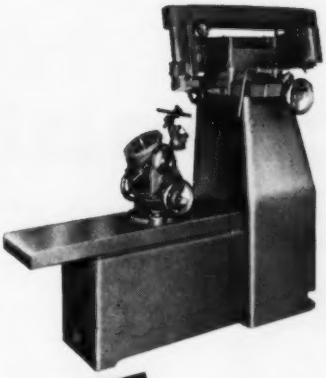


OLIVER *Automatic*
FACE MILL GRINDER

. . . features real economy and fast, accurate grinding. One operator handles several machines. Set-up is simple. The cutter is mounted on the face plate and the automatic indexing mechanism adjusted. Required clearance is set by moving the work spindle to the desired position. All surfaces and radii are ground in one continuous operation.



OLIVER *General Purpose*
FACE MILL GRINDER

. . . heavy duty; for all types of face mill grinding on coarse and fine pitch cutters from 4″ to 24″ in diameter. All angles and clearances are instantly obtained without calculation. The cutter face, periphery and corner angles may be ground without altering the lip rest setting. The machine is completely universal.

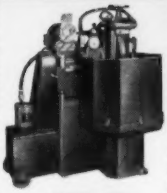
OLIVER *Arc Radius*
GRINDER

. . . for accurate sharpening of face mills, channel cutters, slotting cutters, etc. The face, periphery and corner radius are ground with one pass of the wheel; radius blended in perfectly. The machine will sharpen any radius up to two inches. Periphery clearance may be greater than the face. If desired, the machine will give a straight grind. High speed, diamond wheels may be used.

More **OLIVER** *of* **ADRIAN** *Tool Grinding Equipment*

ACE TOOL and CUTTER GRINDER

Universal—grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.



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Controlled form grinding for high speed, stellite and tungsten carbide single point tools.

No. 510 DRILL POINTER

Semi-automatic. For drills ¾″ to 3″ in diameter. No. 21 bench models available for size ½″ and smaller.

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For low cost reclaiming of drills. Corrects off-center and too-thick webs and out-of-index cutting edges.

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Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 2 types.

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OLIVER INSTRUMENT COMPANY
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- ☐ Drill Pointer
- ☐ Face Mill Grinder
- ☐ "Ace" Universal Tool and Cutter Grinder
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Cincinnati No

Rear left-hand working position is the most convenient for grinding plain helical tooth cutters on CINCINNATI No. 2 Cutter and Tool Grinders.

Wide range and variety of cu
tools which may be accur
ground on a CINCINNATI No. 2
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CINCINNATI®

Knee Type Milling Machines • Bed Type Milling Machin

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2 . . . accurately grinds just about every cutter in the shop

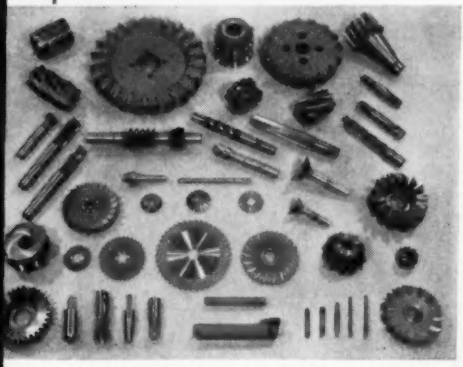
CINCINNATI No. 2's give you the opportunity to attain two desirable objectives in your cutter maintenance program: 1) Cutters of any size and type, ranging from small end mills no bigger than a pencil to heavy 18" diameter face mills, can easily be ground on these machines. 2) Cutters are quickly and accurately restored to top cutting trim. ¶ Check these advantages of CINCINNATI No. 2 Cutter and Tool Grinders against any other equipment within their range:

Anti-friction table slide, with hardened and ground ways

Four operating positions, with both mechanical and electrical controls at operator's finger-tips

Vertically adjustable wheelhead pile, with eccentrically mounted wheelhead to gain extra range

There are many other reasons why you should choose Cincinnati for all your cutter grinding requirements. A few are outlined in Sweet's Machine Tool File. More information in catalog No. M-2004. May we send a copy to you?



CINCINNATI No. 2
Cutter and Tool Grinder
Catalog No. M-2004

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CINCINNATI 9, OHIO

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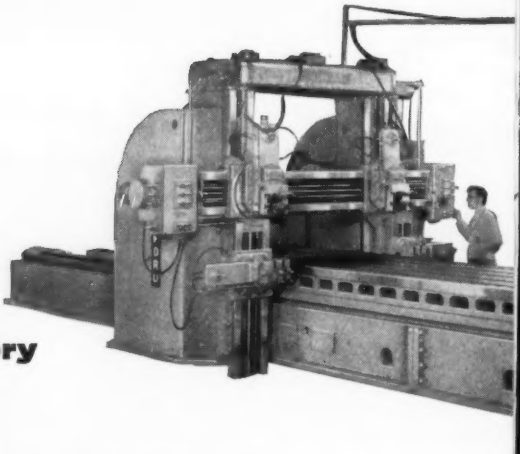
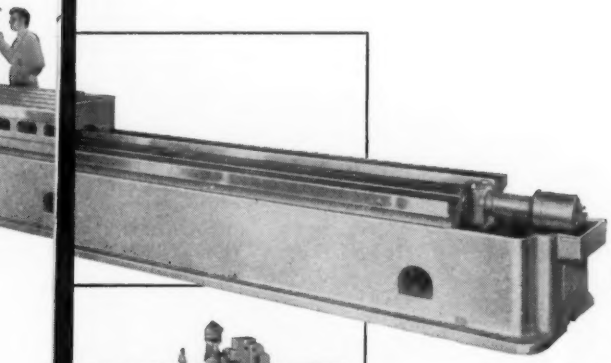


the hy-draulic story

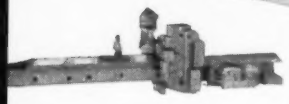
"speeds for carbides plus heavy cut efficiency"

"push-button control speeds operation and set-up"

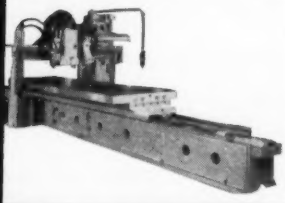
"hy-draulic triple circuit provides 3 distinct drives in a single machin



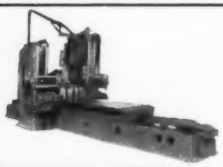
Hy-Draulic Double Housing Planer



20' Hy-Draulic Planer Grinder



raulic Spar Planer with Twin Kopy-Kats



Hy-Draulic Openside Planer
with Outboard Support

...only with hy-draulic design do you get these advantages!

Hy-draulic drive and feeds, as basic features of Hy-Draulic Machine Tools, provide outstanding performance measured in terms of work quality, high production and low operating cost.

Today, countless metal-cutting operations are performed effortlessly, at low cost, and with high production rates on Rockford Hy-Draulic designed machines. Hy-draulic control and power respond instantly so that inexperienced operators easily adapt infinite speeds and feeds to the most complex and accurate machining cuts.

Compare your present shaping, planing or slotting operations with these modern production features, and determine the savings available with Hy-Draulic flexibility. Our engineers will be glad to furnish estimates for your particular requirements.

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

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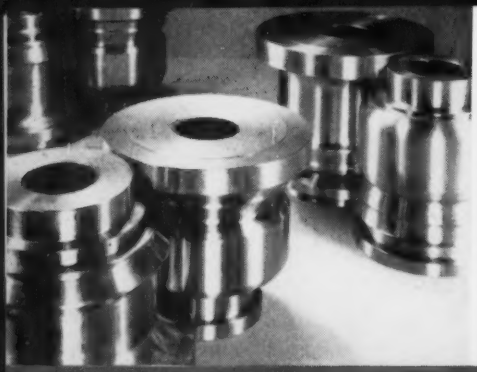
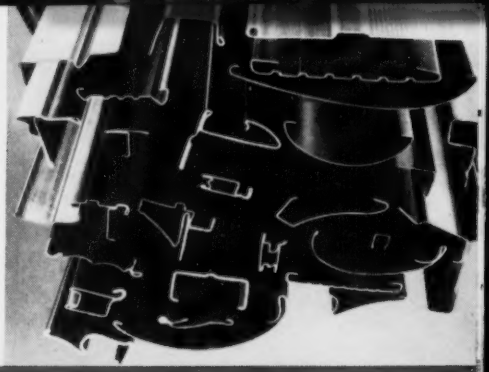
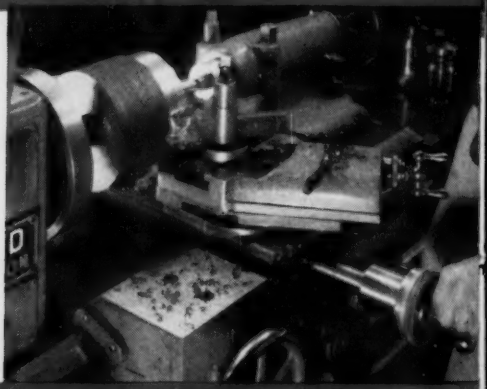


▶ Turning one-of-a-kind rolls that . . .



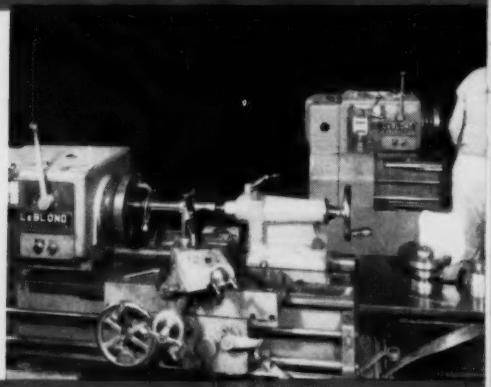
▶ form auto trim molding calls for craftsmanship . . .

▶ and checked . . .

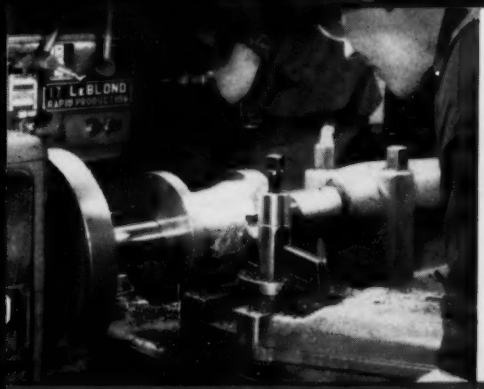


▶ Next, mating male is turned, scraped and checked . . .

▶ simple, convenient feeds and speeds . . . power!

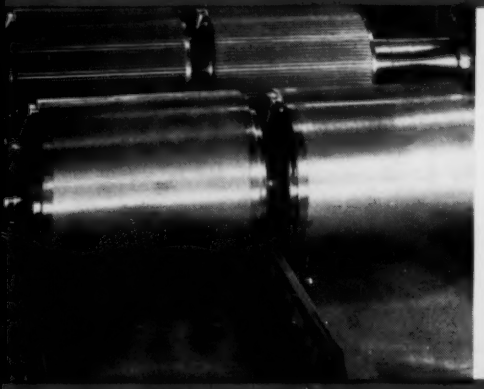


That's why Dexter Roll Form Co., Detroit, bought 2 new LeBlonds . . .



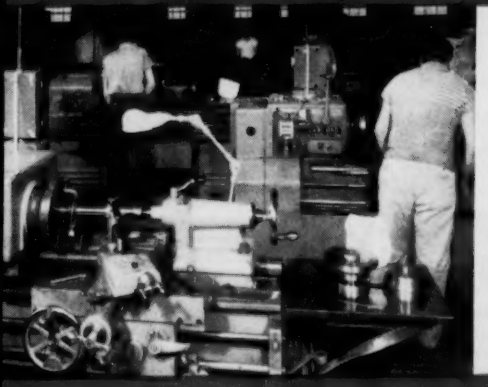
First, females are
turned to near-dimension . . .

scraped with hand-held tool . . .



then final-checked
in rolling mill . . .

Lathe craftsmen need
smooth, responsive controls . . .



to work alongside their
3 LeBlond Dual Drives . . .

Cut with Confidence . . .

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of Cincinnati

The R. K. LeBlond Machine Tool Co.
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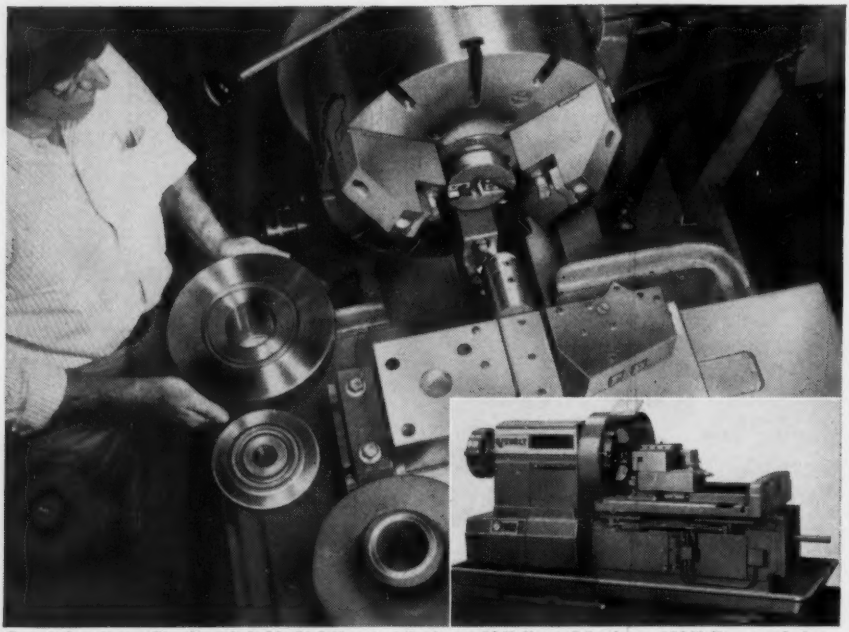
Remember, with turning craftsmen,
it's LeBlond. Ask them.



Smart planning on Simplimatic holds f.t.f. time to 1.7 min. on 6½" diam., 3.3 min. on 10¾" diam. workpieces.

How OTM Corp. cuts costs machining parts in 13 sizes

Handles each part in single chucking, using Simplimatic with back-facing attachments and two-speed motor

You may get ideas from the way OTM Corporation, Houston, Texas, machines steel welding neck flanges and welding necks—with each part in 13 different sizes—completing each part in a single chucking and holding change-over time to an absolute minimum.

Here's how the job is done on a Gisholt Simplimatic Automatic Lathe: Facing, grooving, boring and chamfering operations are performed from tools on short tool slides, with T-slotted tops for quick adjustment. Relieving the boring tool at the end of the cut eliminates tool tracks. Simultaneously, a special back-facing attachment works through the spindle to shave-face and chamfer the O.D. on the hub. A power chuck wrench operates the scroll chuck and permits mounting this attachment in the spindle bore. A two-speed motor provides correct surface speed and permits switching from high speed (for turning and facing) to low speed (for grooving operation) and back again, during the Simplimatic's automatic machining cycle.

Here, again, the Gisholt MASTERLINE Simplimatic Automatic Lathe saves a manufacturer the cost of a special machine. Its extra wide platen table provides ample space for an infinite number of slide and tool arrangements—and its table feed permits tools to engage with the work or perform additional machining operations before actual slide movements begin. Ask your Gisholt Representative to show you how the Simplimatic performs special machine functions at standard machine prices—on your product and under your production conditions.

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GISHOLT MACHINE COMPANY

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WRITE GISHOLT TODAY for new Catalog 1159-C on Gisholt MASTERLINE Simplimatic Automatic Lathe. Shows 39 typical jobs—fully illustrated.

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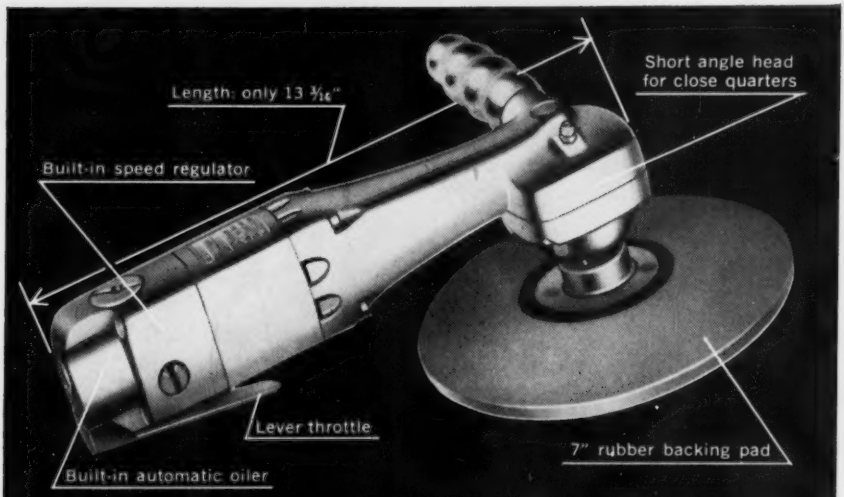
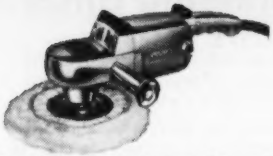
POWER to boost job efficiency with REMINGTON tools



Sander, Model PS-A-307L—Air-powered; speed: 5,900 rpm at 90 psi.; built-in automatic oiler and speed regulator; short angle head: only 3½" high; complete with 7" rubber backing pad, assorted 7" abrasive discs and wrench; wt.: 5⅜ lbs. complete.



Polisher, Model 47P—8" bonnet; free speed: 1400 rpm; load speed: 840 rpm; 115 or 230 volts; heavy-duty ball bearings; wt.: 12 lbs.; with eye-bolt for reel suspension.

Reversible Screwdriver, Model PSDR-204P—Air-powered; reverses with a flip of a lever; adjustable clutch sets screws within 5% of set torque; speed: 1500 rpm at 90 psi.

Remington delivers mobility and all the power you need to help cut production costs. With Remington you can standardize on the industry's widest selection of power tools—air, electric or gasoline-driven—with parts and service from one source. For free booklet describing the complete line of Remington Contractor and Industrial Tools mail Readers' Service card or see your local Remington distributor.

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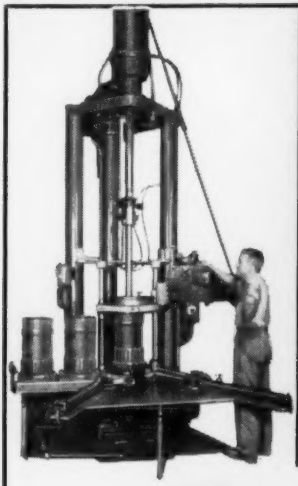

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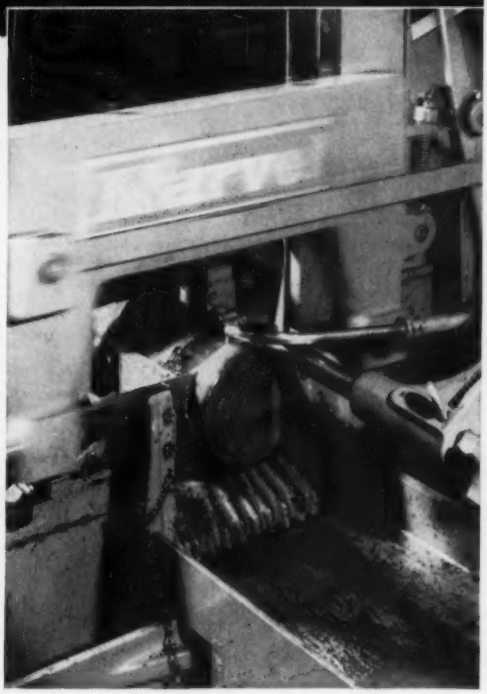
5 Basic Reasons why MARVEL HACK SAWS CUT-OFF MORE ACCURATELY...

The consistently accurate performance of MARVEL Heavy Duty Hack Saws is no accident. MARVEL engineers knew, many years ago, that to produce and maintain accurate cutting-off, a hack saw must be designed and built like a fine machine tool.

Some of the basic design principles built into the modern MARVEL Hack Sawing System that makes it the most accurate cutting-off method you can use are:



1. V-Way Design...Greater Rigidity

Upright and Saddle are precision machined and fitted to form a rigid, integral unit capable of withstanding any cutting load with no deflection or side movement.

2. Anti-Friction Bearing Construction

Anti-friction ball or roller bearings are used at all load carrying points. Even the strongly braced saw frame reciprocates on heavy duty, fully enclosed preloaded ball bearings which provide permanent, frictionless rigidity and true-running, straight line cutting strokes.

3. Minimum Blade Frame Reach

Close-coupled design and crank lever action of MARVEL Saws keeps the saw frame and blade reach very short in relation to the vertical V-ways on which the unit is mounted. This insures optimum rigidity, even under the most severe operating conditions.

4. Positive Relief Blade Lift

On the return stroke, positive relief lift raises the blade to provide proper and "cushioned" lead-in on the next cutting stroke. This prolongs blade sharpness, life and accuracy.

5. Rigid Cutting Tool

Cutting-off accuracy requires a rigidly held, relatively short cutting tool. MARVEL Unbreakable High-Speed-Edge Hack Saw Blades, which combine a narrow high speed steel cutting edge permanently welded to a tough alloy steel body, can be tensioned from 200% to 300% more taut than ordinary blades. This provides a most rigid cutting edge.

Write for the MARVEL Catalog and the complete story on MARVEL METAL CUTTING SAWS

PS-1305

MARVEL Metal Cutting SAWS
Better Machines-Better Blades

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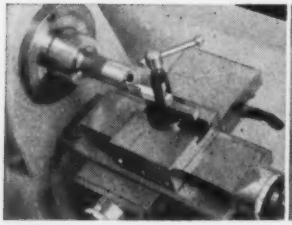
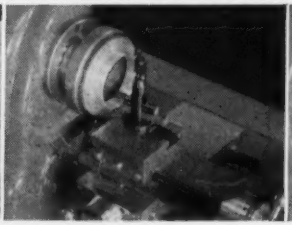
HIGH SPEED PRECISION LATHE

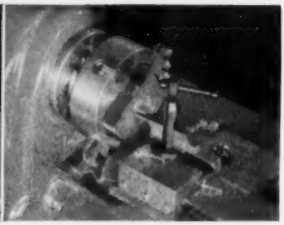
Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".

SPECIFICATIONS:
1⅛" Collet Capacity
9" Swing
17" Center Distance
Infinitely Variable Speed
230—3500 r.p.m.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

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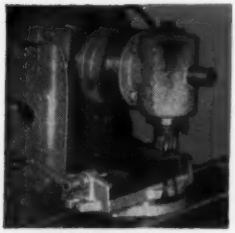
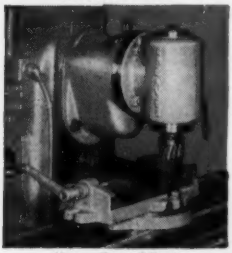


Heavy Duty Vertical Milling Attachment



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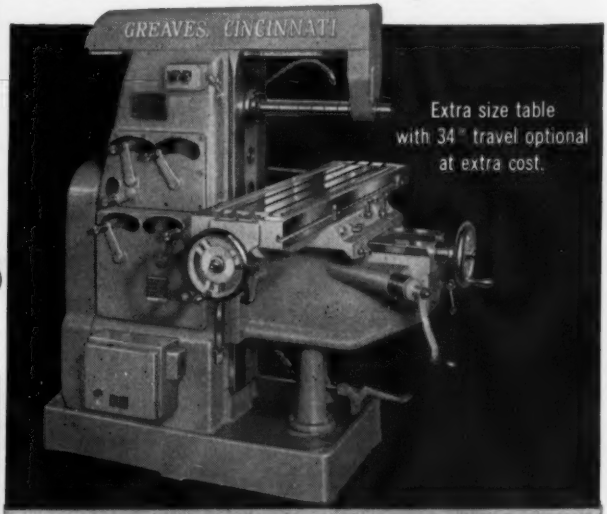

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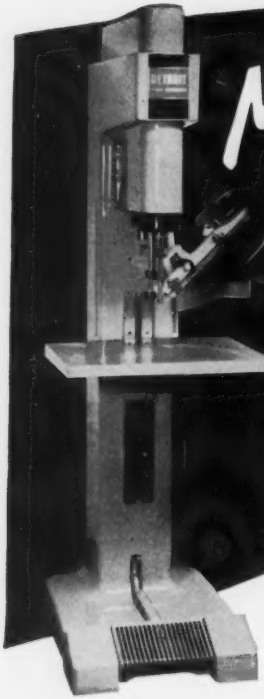

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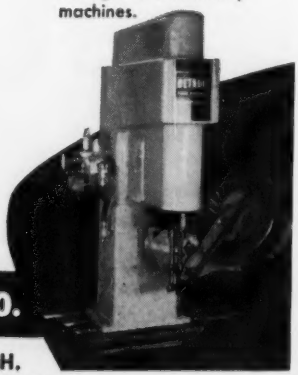

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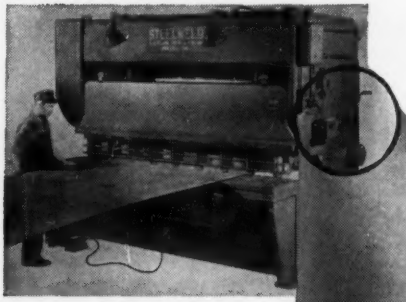

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ONLY STEELWELD SHEARS HAVE THIS SIMPLE KNIFE ADJUSTMENT

It is simple, fast and easy to adjust the knife clearance on a Steelweld Pivoted-Blade Shear to suit every plate thickness. No bolts to loosen! No bed to move! No feeler gauges required!

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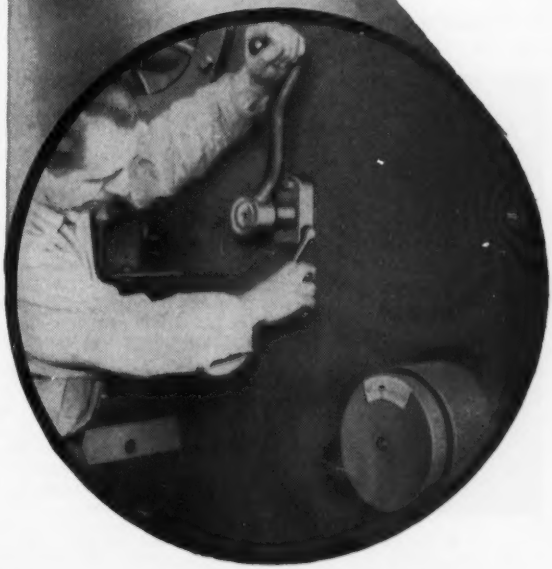
Steelweld Shears are built for thicknesses of 12 gauge to 1¼ inch and for lengths of 6 to 18 feet.



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STEELWELD PIVOTED BLADE SHEARS

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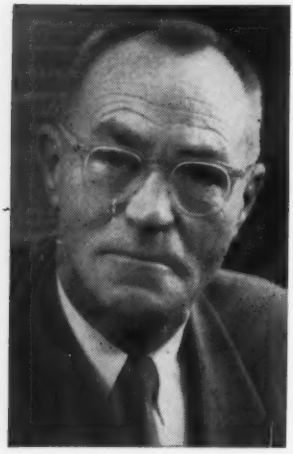
Here's what U. S. Steel Supply **Special Services** mean to Pitter Metal Products, Inc.

"U.S. Steel Supply Special Services help us CUT PRODUCTION COSTS"

says
W. J. Pitter
President
Pitter Metal Products, Inc.
Maywood, California



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"We take advantage of U. S. Steel Supply Special Services by ordering our sheets pre-cut. Thus, we eliminate not only profit-robbing delays caused by cutting the sheets ourselves, but also the risk of costly cutting errors. Our labor costs are reduced, and we have no waste or shortage problems with pre-cut sheets. The price differential is *more* than offset by the speed, variety and technical assistance given by U. S. Steel Supply Special Services."

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Glass covered scales for permanency
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Reed Type Clamp System

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The new 3-dimensional Duplicating Machine received the highest praise at the recent ASTE Tool Show. Cylinders are built into special knee and saddle casting. 12" cross travel, one-shot lubrication system and chrome-plated ways are standard features on this machine.

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Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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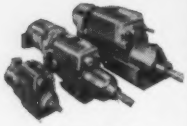
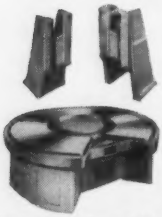
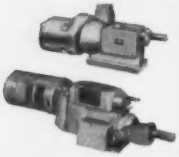


Air Hydraulic Drill Units



Circular Machine Base and Columns



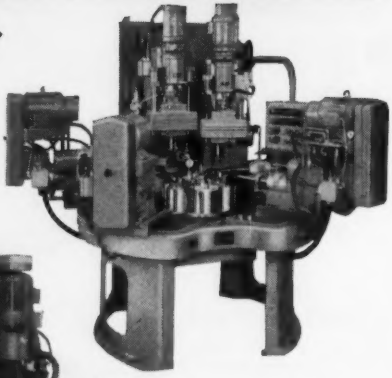
Automatic Lead Screw Tapping Units

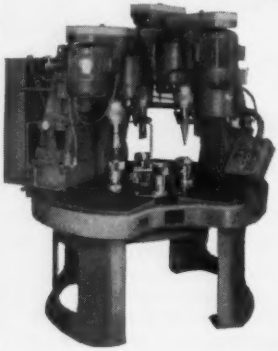
Rectangular Machine Base

EXAMPLE*

A high speed indexing machine to drill and lead screw tap horizontal opposed pipe ports and two vertical mounting holes in stainless steel valve bodies at 320 parts per hour. Standard automatic self-centering Skinner air chucks hold parts.

Photo courtesy of The Skinner Chuck Company





EXAMPLE*

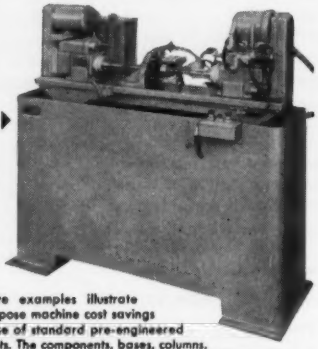
Combination drill, bore and face plus two tapping operations in die cast regulator valve spring cages. Capacity: 450 parts per hour.

Photo courtesy of Watts Regulator Company

EXAMPLE*

Double end opposed combination ream and face die cast piston plates to close tolerance. Simplified air-manual fixture loading permits production of 423 parts per hour.

Photo courtesy of Bendix Products Division Bendix Aviation Corporation



***Note**

The above examples illustrate single-purpose machine cost savings through use of standard pre-engineered components. The components, bases, columns, adapters and units as shown, are available for machines built by you or for you from Hartford Special.

Write today for full information and name of our nearest field man—a specialist in low cost production techniques.

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SURFACE GRINDING

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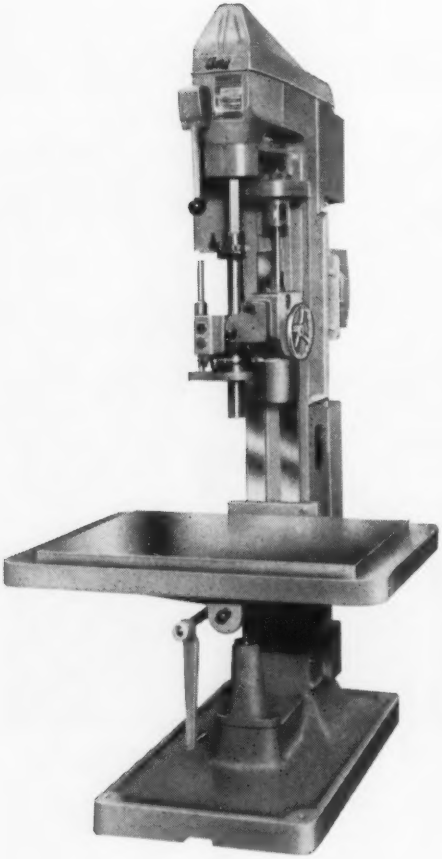
automatic cycle drilling machine



You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Motch & Merryweather Machinery Co., Box 625, Cincinnati 1, Ohio.

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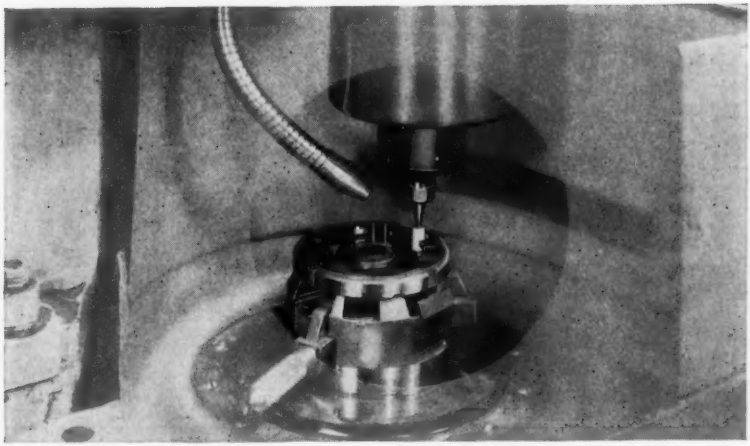
H⬤LES JIG GROUND with *Vulcanaire*



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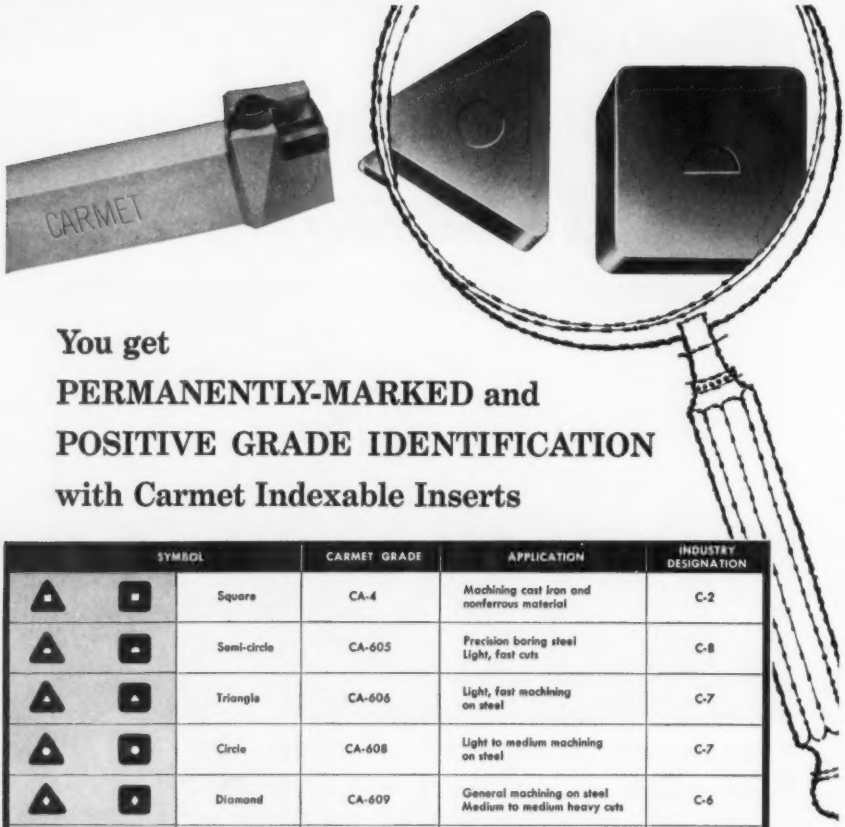

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Triangle	CA-606	Light, fast machining on steel	C-7
Circle	CA-608	Light to medium machining on steel	C-7
Diamond	CA-609	General machining on steel Medium to medium heavy cuts	C-6
Rectangle	CA-610	General machining on steel Heavy roughing cuts	C-6

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318	339	360	381	402	427	452	477	502	527	552	577	602	627
319	340	361	382	403	428	453	478	503	528	553	578	603	628
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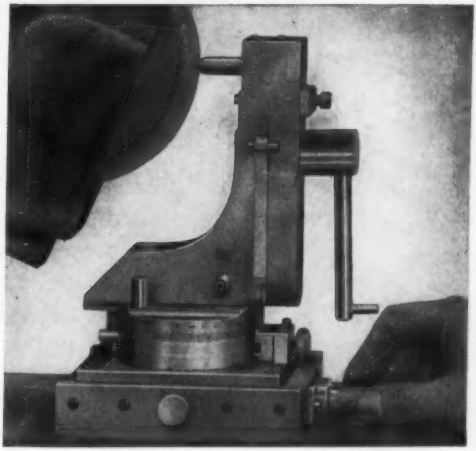
dress two angles tangent to a radius in one continuous motion



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Adaptable to all type cylindrical and surface grinders.

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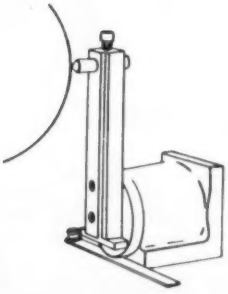

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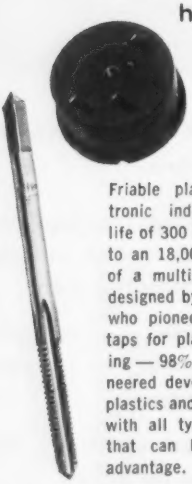

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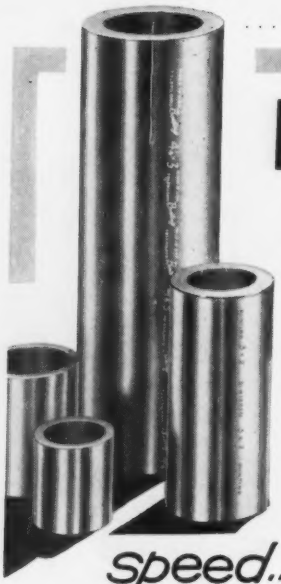

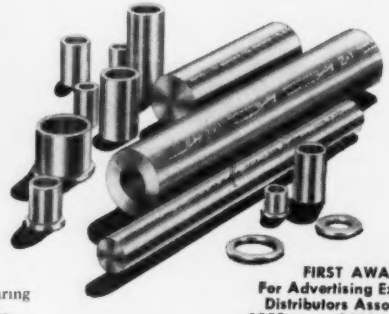

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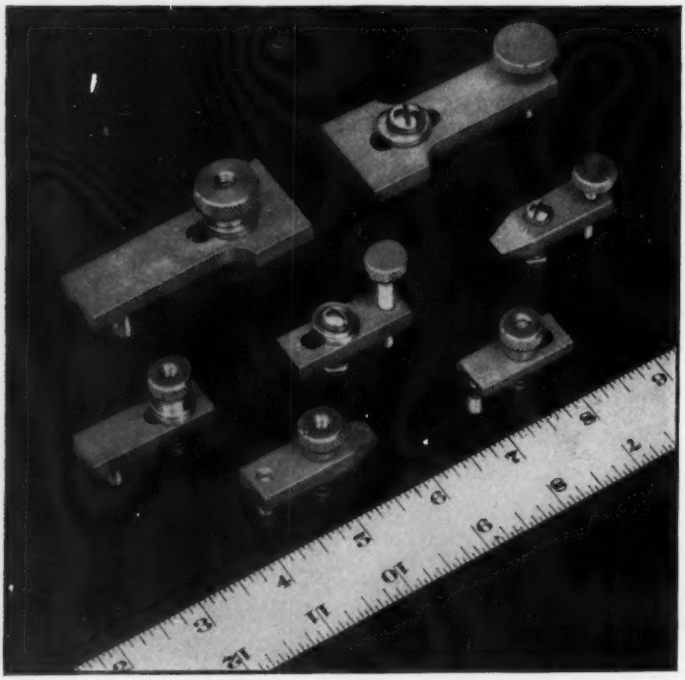

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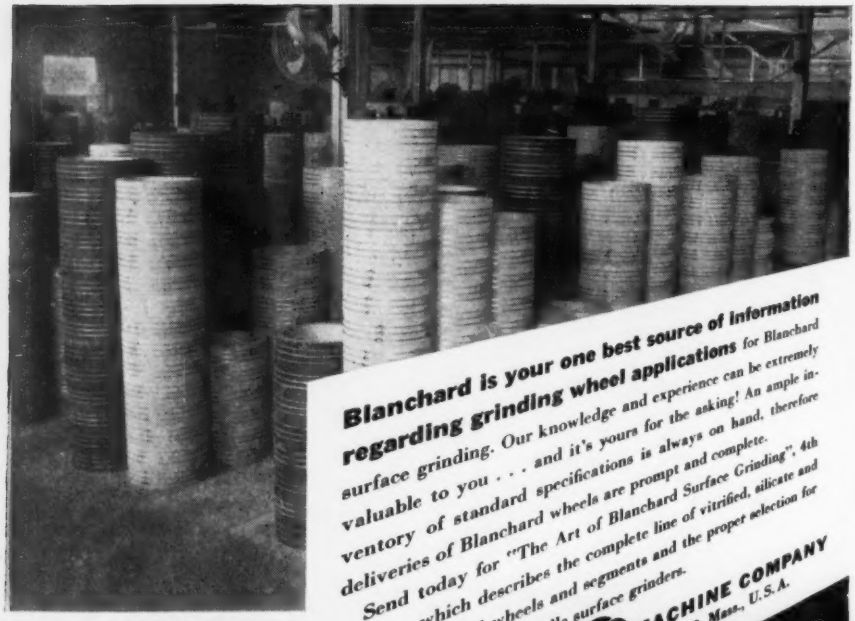

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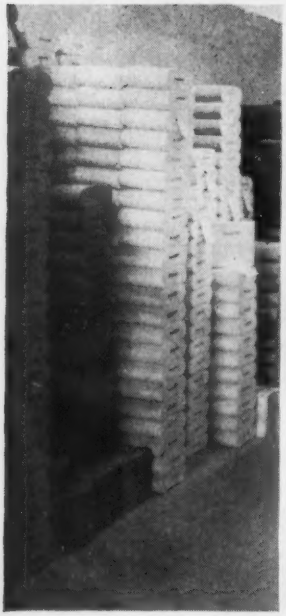

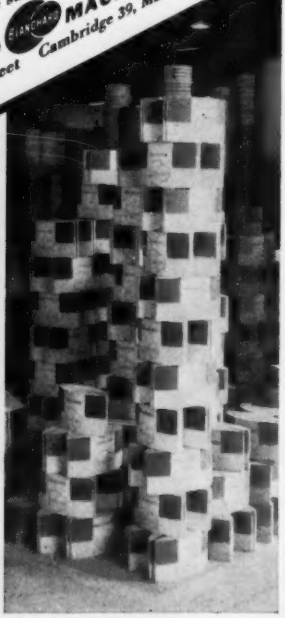

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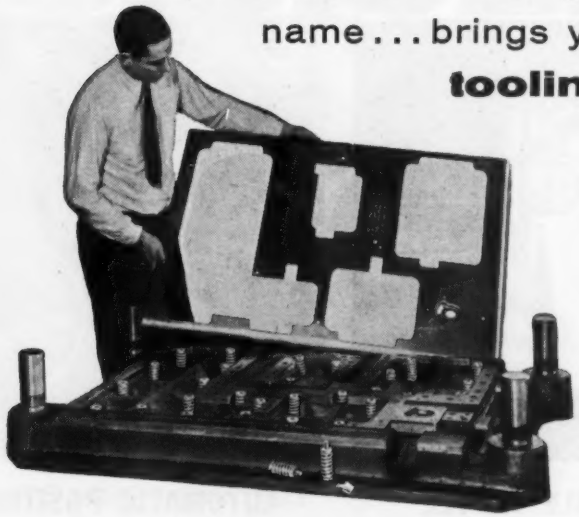
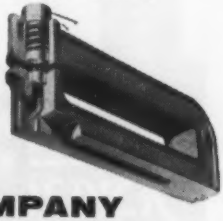
the **STRIPPIT** that gave us our name . . . brings you **lower tooling costs!**



A REVOLUTION IN DIE-MAKING. The famous "Strippit," invented by Wales Strippit Company, saves tool engineers and die-makers endless hours of designing and building stripping mechanism into die sets. These compact, telescoping spring-and-retainer units provide standardized stripping pressures for uniform stripping of blanks from dies. Strippits eliminate spring grinding . . . stripper bolts . . . drilling and counterboring for stripper bolts . . . boring spring pockets . . . permit use of thinner, easier-to-machine stripper plates . . . eliminate turning over the punch holder and die shoe castings after the back sides have been planed. Strippits pay for themselves many times over on every job.

LOWER COST MULTIPLE PIERCING AND NOTCHING. Strippit self-contained units provide the most economical way to notch up to ⅛" mild steel and punch flats, structurals and extrusions up to ¾" mild steel. Quickly set up in any pattern and placed in the press without loss of press time, they give you high production plus quick, economical design changes. Write today for complete details and a demonstration by a Strippit mobile unit at your plant.



A UNIT OF HOUDAILLE INDUSTRIES, INC.

Warehouse stocks in Chicago and Los Angeles.

WALES STRIPPIT COMPANY

207 Buell Road, Akron, New York

Manufactured in Canada by Strippit Tool and Machine Limited, Brampton, Ontario

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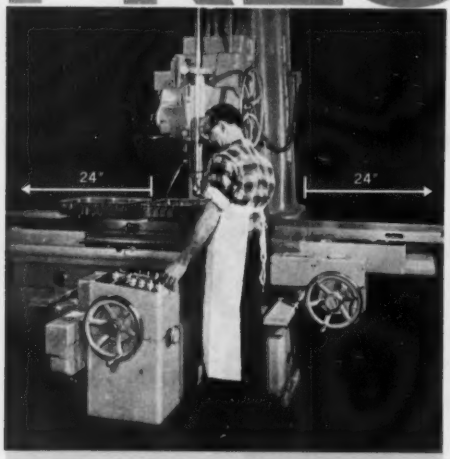
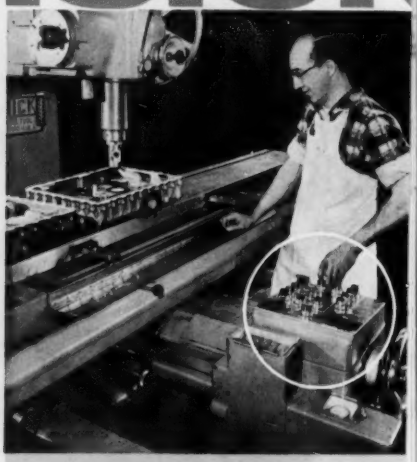
PRECISION



LONG TABLE TRAVEL

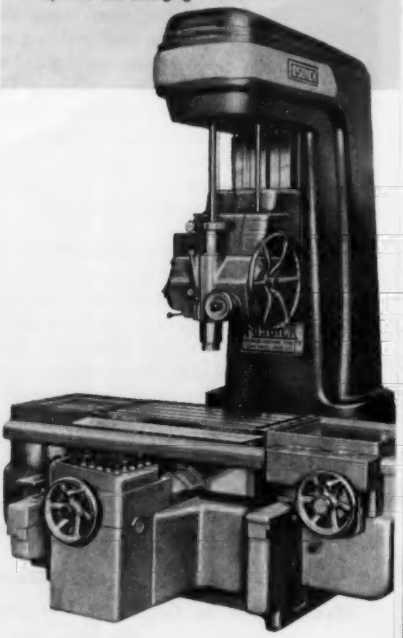
Longitudinal travel—48" Cross travel—22"



AUTOMATIC POSITIONING

with Direct Dimension Measuring and fast B-F Spindle tool changing

FOSMATIC JIG BORER



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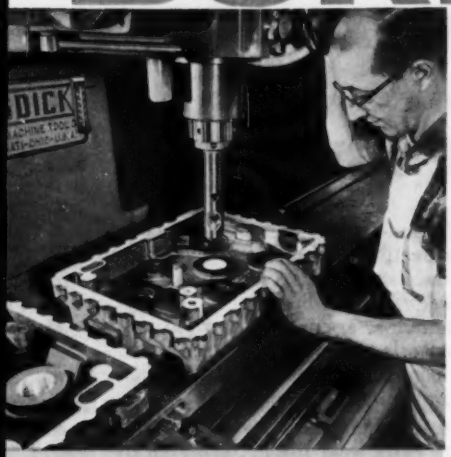
BORING



WITH NO REJECTS

hole location accurate to ±.0001"

hole sizes repeated to ±.0001"

SAVE 300 HOURS PER UNIT

on precision boring of gear boxes. Each unit (2 halves) calls for over 200 holes from ¼" to 4½" dia. Boring, spot facing, recessing, milling, tapping and counter boring. Material is aluminum alloy.

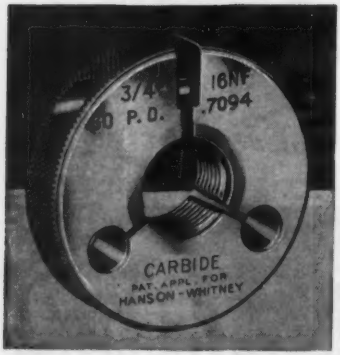
Boring time reduced from 800 hours to 500 hours per unit—with no rejects in all 50 parts—and every one accurate to ±.0001" on hole size and location! Over 200 holes per unit are machined.

Mr. R. Schmidt of Triangle Tool Co., Union, N. J., owner of this Fosmatic Jig Borer, reports, "Two Fosmatic features were largely responsible for this important time saving. First, the Fosmatic's long table travel permitted machining two parts at once. Second, the automatic positioning and Direct Dimension Measuring System work simply and fast. They eliminate confusion and help the operator work accurately and efficiently. Incidentally, that long table travel helped get us several new jobs we could never have handled on our other jig borer."

With Direct Dimension Measuring the operator sets dimensions direct from blueprint onto two direct reading drum dials. At the press of a button, the table automatically positions work to ±.0001". On the Fosmatic, this operation and all other machine functions can be numerically controlled by punched tapes or cards.

Fosmatic Jig Borers bring you many important advances in boring technology. Where progress has been so great, the obsolescence of your old machine may be more costly than you suspect. *Why not run a check?* Call your Fosdick Distributor or write us today.

Ask for Fosmatic Jig Borer Bulletin JB-S



A MEASURE OF PERFECTION

Hanson-Whitney measures gage perfection by the exacting specifications established in H28 Handbook for Screw Thread Standards. These standards assure you of rigid accuracy controls on critical gaging elements, such as *size . . . lead . . . drunkenness* and *angle.*

In addition to this assured quality, you get extra wear life . . . achieved by Hanson-Whitney's "*finished after hardening*" Process. Quality materials, plus finished, lapped surfaces after grinding, produces gages that are truly a "measure of perfection."

Hanson-Whitney offers AGD Cylindrical and Thread, in steel and carbide, National and Unified thread series . . . special thread forms, Acme, Buttress, Round and others made to specifications. Hanson-Whitney also provides a complete line of Internal and External Thread Comparators.

Consult Hanson-Whitney's home and field engineers for practical, *one source* assistance on all threading and gaging problems. H-W Stocking Distributors across the country provide complete service.

Write for catalogs.

Hanson-Whitney COMPANY

Division of Whitney Chain Company

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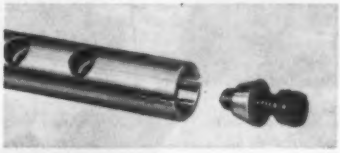
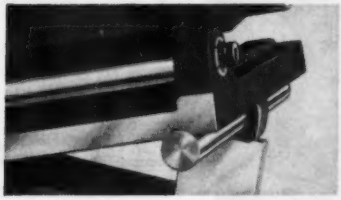
WHY *Robbins* IS YOUR BEST BUY

Only Robbins angular tooling equipment assures you positive accuracy when setting up to machine, grind or inspect angular work . . . because only Robbins gives you these exclusive features:

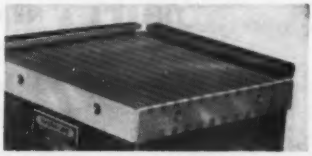
POSITIVE LOCKING locks firmly inside sine bar roll with expanding action for positive lock. Screw at each end locks toward front of unit, always pulls upper member firmly down on gage block without distortion. (Pat. app. for)





"PERMA-FLAT" SWIVEL BLOCK contacts gage block over entire face of swivel block instead of on a single thin line of contact. This patented feature provides greater contact between gage block and unit . . . combines with Robbins positive locking to assure the utmost accuracy.

FINE POLE ceramic magnet chuck, manufactured for Robbins by famed O.S. Walker Company, Inc. Strongest magnetic chuck available. Fine poles make it easier to set up smaller work, go right to the edge for easier setup next to rails.



IN ADDITION, both magnetic and non-magnetic models are built with ribbed base, intermediate and top plates for distortion-free strength and rigidity, with full-length ground roll seats for precision location, greater accuracy. All models make it possible to set up any angular work in just four simple steps . . . in minutes instead of hours! Before you purchase any sine plate, be sure you check Robbins' exclusive features. Write for new catalog!

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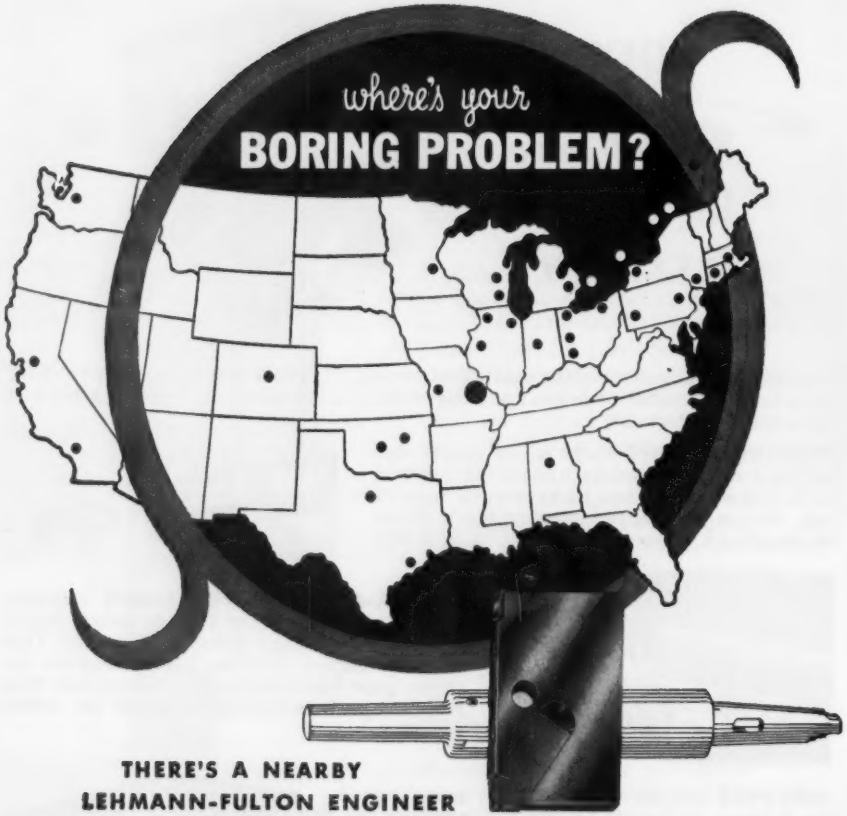

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BLOCKS, BARS AND CUTTERS—STANDARD AND CUSTOM MADE—IN ALL TYPES AND SIZES

Our factory-trained engineers are all over the map. Any of them will help solve your tooling problem . . . by mail, phone or in person.

Have them show you how Lehmann-Fulton hardened block type boring tools cut costs and increase production in ALL your boring operations.

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LEHMANN BORING TOOL
DIVISION OF FULTON IRON WORKS COMPANY
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Lodge & Shipley POWERSHIFT PRESELECTOR

GIVES PRODUCTION PLUS

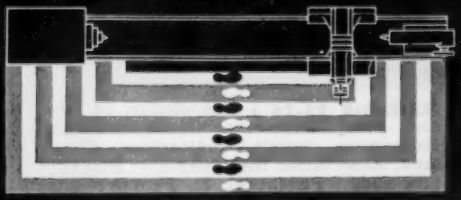
- **TIME SAVING . . .** by eliminating "compromise speed setting" which can waste up to 50% of machining time.
- **INCREASED TOOL LIFE . . .** by using proper cutting speed. You save both tool time and money.
- **FINER FINISH . . .** with the right cut speed greatly reduces grinding required.
- **DECREASED EFFORT & ERROR . . .** preselection of cutting speeds offers another saving in operator time and effort.
- **PROVISION FOR THE FUTURE . . .** POWERSHIFT can be adapted for electronic programming or magnetic tape control.

A SINGLE DIAL . . . COMPUTES! REMEMBERS! SHIFTS! You merely rotate cut speed dial to desired speed (dial computes speed if desired) . . . then, when preset speed is needed, shift to it immediately at the apron! One speed can be preset; up to six others "programmed" with handy indicator tabs. A Lodge & Shipley representative will be glad to explain fully. You'll find his name in the telephone yellow pages. Or, for detailed literature, write:

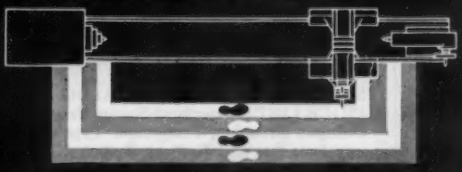
THE LODGE & SHIPLEY CO., 3058 COLERAIN AVE., CINCINNATI 25, OHIO

With a long bed lathe and a job requiring 4 speed changes, an OPERATOR CAN SAVE ALMOST 50% OF HIS "HIKING TIME"

CONVENTIONAL HEADSTOCK . . .
4 trips to headstock . . . 4 to apron



POWERSHIFT PRESELECTOR . . .
only 2 trips to headstock . . . only 2 to apron!



more than ever . . .

Lodge & Shipley

your LODGE-ical choice

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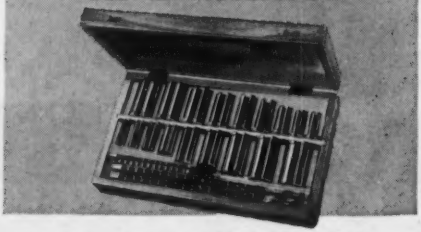
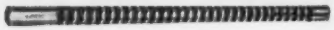
Cut a KEYWAY in 1 Minute



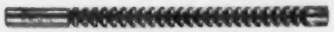
In one minute and for as little as one cent you can cut a keyway with a Minute Man Keyway Broach Kit. For keyways from 1/16" to 1" in any bore from 1/4" to 3".

Save time with these other
STANDARD STOCK BROACHES

SQUARE BROACHES — 1/8" to 3/4" holes

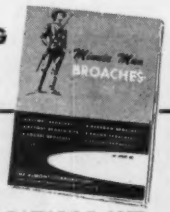


HEXAGON BROACHES — 1/8" to 3/4" holes



ROUND BROACHES — 1/4" to 1" holes

SEND FOR CATALOG AND PRICE LIST



The duMont Corp.
Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name.....

Company.....

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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

AUGUST 19-22 • Western Electronic Show and Convention, Pan Pacific Auditorium, Los Angeles. Information: Wescon, 342 N. LaBrea Ave., Los Angeles 36, California.

SEPTEMBER 7-12 • American Chemical Society, National Chemical Exposition and Conference, International Amphitheatre, Chicago. Society headquarters: 1155 16th St., N.W., Washington 6, D. C.

SEPTEMBER 8-11 • Society of Automotive Engineers, Farm, Construction and Industrial Machinery Meeting and Production Forum and Engineering Display, Milwaukee Auditorium, Milwaukee. Society headquarters: 485 Lexington Ave., New York 17, New York.

SEPTEMBER 10-11 • American Die Casting Institute, Annual Meeting, Edgewater Beach Hotel, Chicago. Institute headquarters: 366 Madison Ave., New York 17, New York.

SEPTEMBER 15-19 • Instrument Society of America, Annual Instrument-Automation Conference and Exhibit, Convention Hall, Philadelphia. Society headquarters: 313 Sixth St., Pittsburgh 22, Pennsylvania.

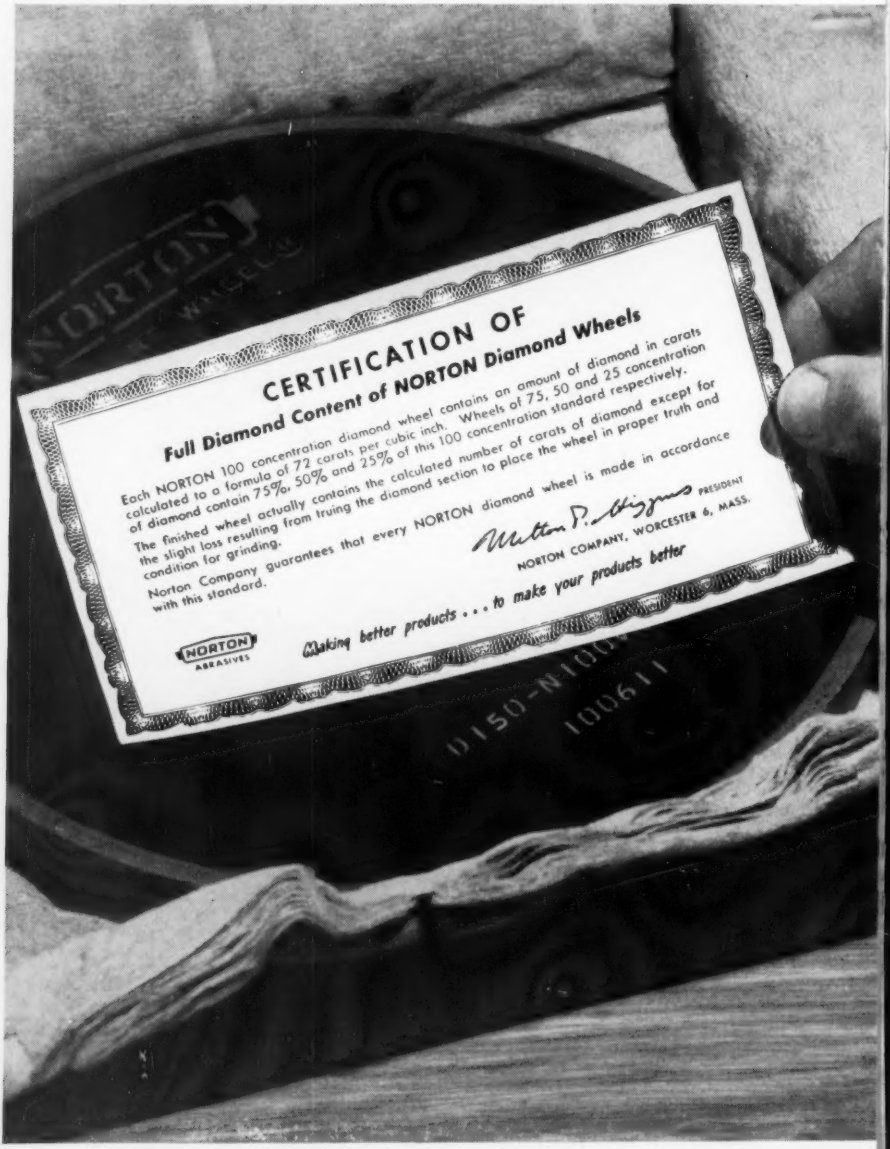
SEPTEMBER 16-18 • Electronic Industries Association, Fall Meeting, St. Francis Hotel, San Francisco. Association headquarters: 1721 DeSales St., N.W., Washington 6, D. C.

SEPTEMBER 22-23 • Steel Founders' Society of America, Fall Meeting, Homestead, Hot Springs, Va. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

SEPTEMBER 23-26 • Association of Iron and Steel Engineers, Convention and Exposition, Public Auditorium, Cleveland. Association headquarters: 1010 Empire Bldg., Pittsburgh 22, Pennsylvania.

SEPTEMBER 28-OCTOBER 2 • Pressed Metal Institute, Annual Executive Meeting, Cloister, Sea Island, Ga. Institute headquarters: 3673 Lee Rd., Cleveland 20, Ohio.

OF COURSE . . . IT'S *American!*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Full Diamond Content of NORTON Diamond Wheels
Each NORTON 100 concentration diamond wheel contains an amount of diamond in carats calculated to a formula of 72 carats per cubic inch. Wheels of 75, 50 and 25 concentration of diamond contain 75%, 50% and 25% of this 100 concentration standard respectively.
The finished wheel actually contains the calculated number of carats of diamond except for the slight loss resulting from truing the diamond section to place the wheel in proper truth and condition for grinding.
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Your Diamond Wheel Insurance Policy

It guarantees the full diamond content of the wheel . . . assures complete dependability of the diamond concentration mark on the wheel itself . . . and bears the signature of the President of Norton Company.

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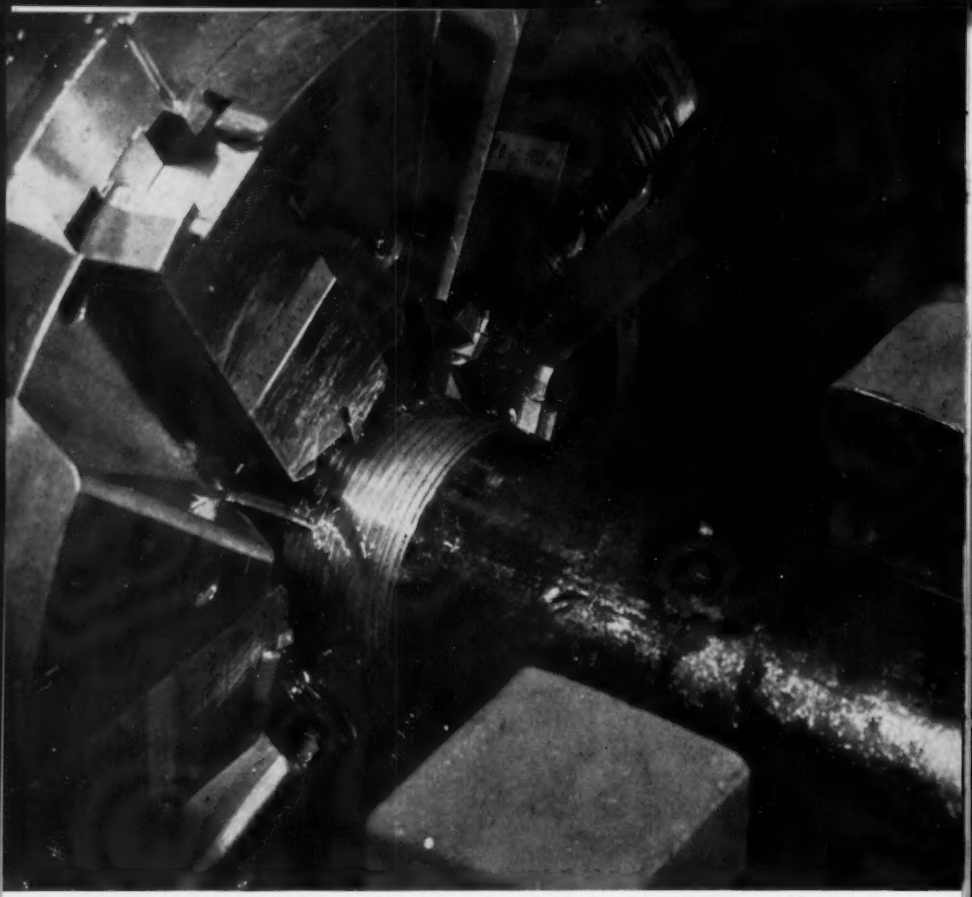

This is just one of the many applications of Sunicut 85, which is one of a whole series of Sunicuts . . . all transparent.

SUNICUT 85 is a heavy-duty cutting oil that lets you see what you're doing

Transparent, fast-draining Sunicut® 85 leaves the workpiece clear for inspection as you go.

Especially designed for use on high-alloy steels, Sunicut 85 is ideal for heavy-duty work on automatic screw machines and production form grinders. It's a natural for pipe threading and similar heavy-duty operations requiring frequent and close inspection.

Easy pumping, fast metal-wetting, and excellent extreme-pressure lubrication are other advantages of Sunicut that lead to production economy for you.

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SUN OIL COMPANY, Phila. 3, Pa

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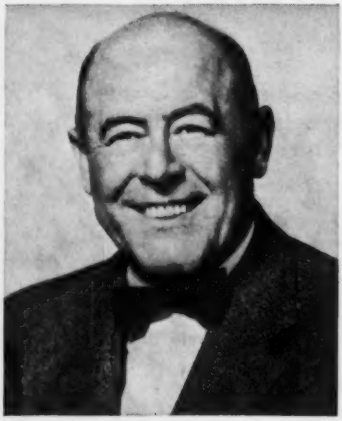
Men of Modern Machine Shop



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modern machine shop
431 Main St. Cincinnati 2, Ohio

free literature

new literature

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Pneumatic Crimper
Production Devices, Inc., Whitehall, Washington County, N. Y. Leaflet describes and illustrates the Airlox Pneumatic Crimper, primarily designed for solderless terminals.
For more data circle 1 on Postpaid Card

Machine Vise
Wharton Unitools, Valley Stream, L. I., N. Y. Illustrated bulletin describes the Taylor Machine Vise, which is available in 24 sizes and 10 models.
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Marking Machine
Jas. H. Matthews and Co., 3944 Forbes Ave., Pittsburgh 13, Pa. Bulletins 146-C25 and 146-C26 describe and illustrate the complete line of Airgrit Blast-Etch Marking Machines, from standard stationary to portable and inspection type units.
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Magnesium Tooling Plate
The Dow Chemical Co., Department MA 1420V-1, Midland, Mich. Fifty-five page shop manual covers magnesium tooling plate properties, use of magnesium extrusions in tooling, shop characteristics of magnesium alloys, machining instructions and so on.
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Precision Gage Set
K and K Grinding Co., 230 Richardson St., Brooklyn, N. Y. Bulletin describes and illustrates precision gage sets. Included is a specification chart for nominal sizes based upon 1/16 inch diameters.
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Thread Ring Gages
Alameda Gage Co., 10851 Capital Ave., Oak Park 37, Mich. A helpful data sheet concerning the use and care of thread ring gages.
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Drills and Reamers
Precision Twist Drill and Machine Co., 10 Woodstock St., Crystal Lake, Ill. Forty page catalog (No. C-58) describes carbide and carbide tipped drills and reamers. It offers a simplified system of pricing and features the company's complete line of drills.
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Sub-Micron Filtration
Alsop Engineering Corp., 58 Aster St., Milldale, Conn. Brochure entitled "Twelve Avenues to Metalworking Cost Reduction" completely covers the Alsop method of sub-micron filtration.
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Live Center
Motor Tool Manufacturing Co., Post Office Box 3805, Detroit 5, Mich. Illustrated literature, specifications and prices concerning the Motor Tool Live Center, which carries its own replacement point in its taper shank.
For more data circle 9 on Postpaid Card

Tungsten Carbide Tools
S and E Machine Products, Inc., Bridgeport, Mich. Forty-eight page illustrated catalog describes drill bushings, drills, end mills, reamers, burs, dental burs, gages, master discs, centerless grinding fixtures and special carbide cutting tools.
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Rectifier
Rapid Electric Co., 2877 Middletown Rd., Bronx 61, N. Y. Bulletin NIC-1 describes and illustrates Rapid Electric Selenium Rectifiers for magnetic chucks.
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Portable Power Tool
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill. Industrial Tool Catalog No. 85 contains 47 pages of illustrations and specifications of all Thor portable electric and air tools.
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Hardness Testers
American Chain and Cable Co., Inc., Wilson Mechanical Instrument Division, 230-G Park Ave., New York 17, N. Y. Bulletin No. TT-58 describes the Twintester, which combines functions of Rockwell and Superficial Testers.
For more data circle 13 on Postpaid Card

Storage System
Jarke Manufacturing Co., 6333 Howard St., Niles 31, Ill. Folder illustrates and describes various storage systems, such as prefabricated Mini-Module storage racks, hook and flange type portable bar racks, wire coil racks, strip coil racks and so on.
For more data circle 14 on Postpaid Card

Dial Type Miller
The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Catalog No. M-2003 contains 45 pages devoted to illustrating and describing the Nos. 2, 3 and 4 Plain, Universal and Vertical Dial Type Milling Machines.
For more data circle 15 on Postpaid Card

Silent Stock Tube
Brown and Sharpe Manufacturing Co., Providence 1, R. I. Bulletin SM37 describes and illustrates how to muffle stock clatter by using Brown and Sharpe Silent Stock Tubes.
For more data circle 16 on Postpaid Card

Grinding Wheel Adapters
Wm. Sopko and Sons Co., 140 East 267th St., Euclid 32, Ohio. This illustrated catalog shows the company's line of grinding wheel adapters and toolroom accessories.
For more data circle 17 on Postpaid Card

Woodruff Cutters
Quality Tool Works, 792 South Market, Waukegan, Ill. Leaflet describes and illustrates the company's line of Quick Change Woodruff Cutters. The cutters are available with straight or stagger tooth design.
For more data circle 18 on Postpaid Card

Slitting
The Ohio Knife Co., Department 73-HH, Cincinnati 23, Ohio. This booklet has been written primarily to aid the new slitter operator and has been based upon years of practical experience in dealing with slitting and cutting operations.
For more data circle 19 on Postpaid Card

Slide Rule
Leland-Gifford Co., Worcester 1, Mass. A handy slide rule, for determining cutting speeds and times, is offered to anyone requesting same on his company letterhead.
For more data circle 20 on Postpaid Card

Threading Head
Landis Machine Co., Waynesboro, Pa. Bulletin F-80-7 fully illustrates and describes the Landis line of hardened and ground die heads.
For more data circle 21 on Postpaid Card

Tool Steel
Crucible Steel Company of America, Department TD11, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Technical manual, entitled "Tool Steels for Forging Operations," treats the use of various grades of tool steels for the hot forging of steel.
For more data circle 22 on Postpaid Card

Cutting Tools
Vascoloy-Ramet Corp., 868 Market St., Waukegan, Ill. An 88 page plastic bound catalog describes and illustrates the complete line of V-R cutting tools.
For more data circle 23 on Postpaid Card

Hydraulic Cylinder
Pathon Manufacturing Co., Cincinnati 12, Ohio. Bulletin No. 24 describes and illustrates a complete line of air cylinders for low pressure hydraulic service and, also, three series to suit all applications.
For more data circle 24 on Postpaid Card

Fountain Brush
The Dykem Co., 2301-F North Eleventh St., St. Louis 6, Mo. Pamphlet illustrates and describes the Dykem Fountain Brush in bottle, which consists of a soft hair brush with a hollow handle attached to a squeezable translucent bulb, joined to a screw cap of a non-breakable bottle.
For more data circle 25 on Postpaid Card

Vertical Profiler
Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. This 12 page brochure describes and illustrates the Magnespark Vertical Profiler, which is claimed to be a new concept tracer control for automatic 360 degree profiling.
For more data circle 26 on Postpaid Card

Gage Handle
Huron Machine Products, Inc., 6252 Monroe Boulevard, Detroit, Mich. Flyer illustrates and describes the Foster Gage Handle, which fits any American Gage Design Standard Taperlock Plug Gage.
For more data circle 27 on Postpaid Card

Hydraulic Cylinder
Hanna Engineering Works, 1765 North Elston Ave., Chicago 22, Ill. Catalog 900 contains complete information on the company's line of Powrdraulic Hydraulic Cylinders.
For more data circle 28 on Postpaid Card

Swaging Machine
The Torrington Co., Swaging Machine Division, Torrington, Conn. Brochure describes the Electro-Hydraulic Die Closing Rotary Swaging Machine.
For more data circle 29 on Postpaid Card

Hobbing Machine
Cleveland Hobbing and Machine Co., a division of Textron, Inc., 1311 Chardon Rd., Cleveland 17, Ohio. Catalog No. 600 contains 12 pages which describe and illustrate the Cleveland line of single spindle and rotary hobbing machines.
For more data circle 30 on Postpaid Card

Form Grinder
The Thompson Grinder Co., Springfield, Ohio. An eight page catalog (T558) describes Types B and C Truforming Grinders. Drawings illustrate how the grinder works and eight case histories of typical jobs accomplished are included.
For more data circle 31 on Postpaid Card

Environmental Test Equipment
Trop-Arctic, Inc., 3000 South Hackley St., Muncie, Ind. Bulletin 201 describes and illustrates the company's line of environmental test equipment and ultra low temperature equipment.
For more data circle 32 on Postpaid Card

Stainless Mechanical Tubing
The Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Technical Bulletin TB-365A is an eight page folder which explains how the use of the right type of stainless steel mechanical tubing will result in savings to the manufacturer.
For more data circle 33 on Postpaid Card

Padded Shipping Bags
Jiffy Manufacturing Co., 377 Florence Ave., Hillside, N. J. Catalog sheet describes and illustrates the Jiffy Reinforced Padded Shipping Bags, designed to protect items normally packed in folding and setup boxes.
For more data circle 34 on Postpaid Card

O.B.I. Presses
The Federal Press Co., 804 Division St., Elkhart, Ind. Bulletin No. 13 contains 18 pages which completely describe and illustrate the company's line of open back inclinable presses.
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Die Pad Retainer
Harco Engineering, 12092 Woodbine Ave., Detroit 39, Mich. Bulletin describes and illustrates how Harco Die Pad Retainers have been designed to hold die pads firmly to shoes and provide unusual load and strength characteristics in all production die stamping operations.
For more data circle 36 on Postpaid Card

Toolroom Lathe
South Bend Lathe Works, South Bend 22, Ind. Pamphlet describes and illustrates the South Bend 16 Inch Precision Toolroom Lathe, which features a six foot bed.
For more data circle 37 on Postpaid Card

Vertical Milling Machine
Fenlind Engineering Co., 5602 Pike Rd., Rockford, Ill. Bulletin describes and illustrates the design features of the Rockford Vertical Mill and gives complete specifications of this milling machine.
For more data circle 38 on Postpaid Card

Valve Remote Control System
Stow Manufacturing Co., 443 State St., Binghamton, N. Y. No. 5811 twenty page design manual, concerning a line of manual remote valve controls, gives design data on flexible shaft and standard reach rod remote valve controls.
For more data circle 39 on Postpaid Card

Bars and Cutters
Robert H. Clark Co., 9330 Santa Monica Boulevard, Beverly Hils, Calif. Catalog No. 51 describes and illustrates adjustable finishing and roughing bars with cam-lock floating mount in types for both finishing and rough boring. Also shown are finishing and roughing cutters, boring tools, spade drills, spotfacers, counterbores and so on.
For more data circle 40 on Postpaid Card

Bearings and Bushings
The Bunting Brass and Bronze Co., Toledo 1, Ohio. Catalog No. 58 lists a complete line of finished and machined bronze bearings, bushings and bars. Catalog No. 258 lists specifications of 343 cast bronze electric motor bearings.
For more data circle 41 on Postpaid Card

Lubricating and Electrical Devices
Trico Fuse Manufacturing Co., Milwaukee, Wis. Catalog No. 58 contains eight pages devoted to descriptive data, explaining the usage of the various types of both Trico Electrical and Lubricating Devices.
For more data circle 42 on Postpaid Card

Lathe Tracer Attachment
True-Trace Sales Corp., 9830 East Rush St., El Monte 38, Calif. Four page bulletin illustrates and describes the True-Trace single dimension 45 degree lathe tracer attachment.
For more data circle 43 on Postpaid Card

Sheet Metal Fabrication
Littleford Brothers, Inc., 433 East Pearl St., Cincinnati 2, Ohio. This catalog completely illustrates and describes the company's facilities designed for the plate and sheet metal fabrication of such products as tanks, housings, panel boards, weldments, bases, power plants, machine pans and guards, as well as a wide variety of special shapes and forms.
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Grinding Head
Threadwell Tap and Die Co., Greenfield, Mass. Bulletin describes and illustrates the Grind-A-Matic, which is an air turbine grinding head, which can be mounted either vertically or horizontally on almost any machine tool.
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Screw Machine Tools
George L. Detterbeck Co., Inc., 1871 Clybourn Ave., Chicago 14, Ill. Descriptive literature on standard screw machine cutting and accessory tools. The complete range of stocked items are shown in blueprint form.
For more data circle 46 on Postpaid Card

Work Driver
Seneca Falls Machine Co., Seneca Falls, N. Y. Bulletin D-57 describes a work driver for use on any type of engine lathe, multiple tool lathe or plain or universal grinder. The bulletin is illustrated to show use on semi-automatic lathes, engine lathes and grinders. Specifications and various diagrams are included in the bulletin.
For more data circle 47 on Postpaid Card

Magnetic Holding Devices
Hanchett Magna-Lock Corp., Department MM-38, Big Rapids, Mich. This 27 page brochure gives detailed information and illustrations of the company's complete line of magnetic chucks and holding devices.
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Jig Boring and Milling Machine
Suburban Machine Co., 5963 Harrison Ave., Cincinnati 11, Ohio. Four page bulletin illustrates and describes the Angle Master Jig Boring and Milling Machine. Features of this machine and a specification table are provided.
For more data circle 49 on Postpaid Card

Carbide Drills and Reamers
M. A. Ford Co., 1545 Rockingham Rd., Davenport, Iowa. Bulletin No. 805 includes complete specifications on solid carbide drills from No. 60 through ½ inch; and solid carbide reamers, 1/16 through ⅜ inch. Attached is a complete price list showing the range of sizes available, together with information on the new Ford assorted quantity discount.
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Shoe Clamps
Standard Parts Co., 1000 Broadway, Bedford, Ohio. Bulletin on swivel toggle shoe clamps for any mechanical jaw where push and pull pressure is required.
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Machining Unit
American Edelstaal, Inc., Unimat Division, 350 Broadway, New York 13, N. Y. Bulletin completely illustrates and describes the many applications for the Unimat Basic Unit, which is a machining unit for small parts.
For more data circle 52 on Postpaid Card

Duplex Grinder
Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54, Mich. Bulletin No. 242 completely describes the Hammond SCE-10 Oscillating Electrolytic Duplex Grinding Machine.
For more data circle 53 on Postpaid Card

Liquid Coating
Gulf Oil Corp., Department DM, Gulf Building, Pittsburgh 30, Pa. Bulletin illustrates the many applications for Metalcoat A, which is an aluminum pigmented liquid coating that protects metal surfaces against rust and corrosion.
For more data circle 54 on Postpaid Card

Hand Screw Machine
Rockwell Manufacturing Co., Delta Power Tool Division, 400 North Lexington Ave., Pittsburgh 8, Pa. Bulletin describes and illustrates the Delta Precision Hand Screw Machine and many of its applications.
For more data circle 55 on Postpaid Card

Cams and Cam Making Machines
Rowbottom Machine Co., Waterbury, Conn. Catalog C-58 illustrates a variety of box, barrel, side and index cams.
For more data circle 56 on Postpaid Card

Band Sawing Machine
Johnson Manufacturing Co., 1011 Barnes St., Albion, Mich. Eight page catalog contains complete detailed information, specifications, illustrated and in-use photographs of all Johnson Saws, as well as stock stands and accessories.
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Wheel Dresser
Hoglund Engineering and Manufacturing Co., Inc., 369 Snyder Ave., Berkeley Heights, N. J. Literature on the Model 105 hydraulic contour wheel dresser for use on surface grinders.
For more data circle 58 on Postpaid Card

Socket Head Cap Screws
Standard Pressed Steel Co., Box 556, Jenkintown 22, Pa. Four page bulletin describes and illustrates socket cap screws, of a new design, which are said to double joint strength.
For more data circle 59 on Postpaid Card

Index Table
Ferguson Machine Corporation of Indiana, 7818 Maplewood Industrial Court, St. Louis 17, Mo. Catalog No. 302 describes design characteristics of the roller gear drive indexing mechanism in the line of Intermittor index tables and rotary transfer machines.
For more data circle 60 on Postpaid Card

Forgings
The Billings and Spencer Co., Hartford 1, Conn. Sixteen page fully illustrated brochure takes the reader through the many interesting departments which produce Billings Precision Forgings.
For more data circle 61 on Postpaid Card

Drilling and Tapping Units
HyPneuMat, Inc., 647 West Virginia St., Milwaukee, Wis. Bulletin No. 5810 describes and illustrates this company's complete line of automatic drilling and tapping units, either air or hydraulic powered.
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Coolant Nozzle
Universal Metal Hose Co., 2113 South Kedzie Ave., Chicago 23, Ill. Bulletin 2A, IPB-Sec. describes and illustrates the Universal "Full-Flo" coolant nozzles with aerator.
For more data circle 63 on Postpaid Card

Heat Treating Equipment
Lindberg Engineering Co., 2444 West Hubbard St., Chicago 12, Ill. This 22 page two color Bulletin No. 242 contains photographs and describes hardening, carbonitriding and carburizing furnaces of batch and continuous types.
For more data circle 64 on Postpaid Card

Rotary Table
Advance Products Corp., North Shore Drive, Benton Harbor, Mich. Leaflet describes and illustrates the Advance 15 Inch Rotary Table.
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Automatic Part Feeder
Cook and Chick Co., 2415 West 24th St., Chicago 8, Ill. Bulletin describes and illustrates a complete line of hopper type automatic part feeders.
For more data circle 66 on Postpaid Card

Turning Tool
Bradley Machinery Co., 4400 Conner, Detroit 15, Mich. Catalog describes a tool box which turns hexagonal, octagonal and other irregular contours from round stock, drilled and finished in only one operation.
For more data circle 67 on Postpaid Card

Angle Dresser
Reliance Tool and Manufacturing Co., 1919 Clybourn Ave., Chicago 14, Ill. Flyer describes an angle dresser, which will dress angles from zero to 180 degrees.
For more data circle 68 on Postpaid Card

Handles, Handwheels and Knobs
Reid Tool Supply Co., Muskegon Heights, Mich. This 74 page catalog gives complete information on handles, handwheels, knobs, broaches, bolts, springs, sleeves and so on.
For more data circle 69 on Postpaid Card

Rotary File
Rota File Corp., 1974 Sixty-sixth St., Brooklyn, N. Y. Eleven page brochure covers the various shapes and sizes of rotary files and carbide burrs.
For more data circle 70 on Postpaid Card

Measuring Indicator
M. E. Hodge Corp., 35 North Raymond Ave., Pasadena 1, Calif. Literature describes the Trav-A-Dial Indicator, which measures the complete longitudinal travel of any machine tool.
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Hydraulic Cylinder
Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill. Bulletin JH-104N contains 31 pages, designed to serve as a practical textbook embracing all important aspects of the use of hydraulic power cylinders.
For more data circle 72 on Postpaid Card

Elevating Table
Economy Engineering Co., 4507 West Lake St., Chicago 24, Ill. Bulletin ET-245 describes and illustrates an elevating table, which has been designed to lift a 2,000 pound load from 24 to 42 inches above the floor.
For more data circle 73 on Postpaid Card

Collet Index Fixtures
Hardinge Brothers, Inc., Elmira, N. Y. Bulletin CIF contains complete information on collet index fixtures.
For more data circle 74 on Postpaid Card

Self-Locking Set Screws
Set Screw and Manufacturing Co., 152 Main St., Bartlett, Ill. Self-locking set screw selector chart shows over 1,001 availabilities in self-locking set screws.
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Coil Handling Equipment
Dixon Automatic Tool Co., Inc., 2314 Twenty-Third Ave., Rockford, Ill. Bulletin illustrates standard models of the Dixon One Man Coil Grab and shows how to handle all coil sizes safely, rapidly and without damage.
For more data circle 76 on Postpaid Card

Air Cylinders
The A. K. Allen Co., 255 East Second St., Mineola, N. Y. This 47 page catalog illustrates the complete line of AllenAir air cylinders, air valves and clamps.
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Dial Indicators
Petz-Emery, Inc., Pleasant Valley, N. Y. Twelve page Catalog D describes and illustrates the company's expanded line of Em-re Dial Indicators.
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Tubing
Vermont Flexible Tubing Co., Lyndonville, Vt. Flyer illustrates and describes "Sealflex" tubing, which is leakproof. It bends and will stay put in any position. This tubing can be used for coolant, cutting oils and solvents.
For more data circle 79 on Postpaid Card

Centerless Turning Machine
Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. Y. Bulletin illustrates and describes the Karge Turnomat Automatic Centerless Turning Machine.
For more data circle 80 on Postpaid Card

OVER THE EDITOR'S DESK . . .

GREAT GOOF-OFF

We are indebted to a MMS reader in a Cleveland, Ohio plant who sent us this item which he found in a recent issue of the Plain Dealer.

Charles Brower, president of Batten, Barton, Durstine & Osborn, recently described what is wrong with this country as "the great goof-off."

"The land from coast to coast," he said, "is enjoying a stampede away from responsibility. It is populated with laundrymen who don't bother to iron shirts; with waiters who won't serve; with carpenters who will come around some day, maybe; with executives whose minds are on the golf course; with students who take cinch courses because the hard ones make them think; with spiritual delinquents of all types who are triumphantly determined to enjoy something called 'The New Leisure'."

And our most grievous misconception today is a lack of realism concerning Russia, in the opinion of Publisher John S. Knight, who said in a recent speech:

"We may dislike the Communist ideology. We may abhor Russian regimentation of the individual. But we must see the Russia of today as a grim reality, and not as a backward and inefficient nation made up of barbarians.

"Everybody works in Russia, or they don't eat. Over here, we try to get the other fellow to do our work for us.

"You don't have to like the Russian system to concede that it is working and working to our detriment if we continue to regard the coffee break, the two-hour lunch and the three-day weekend as more important factors in our lives than application and achievement."

This, it seems to us, states the problem clearly. We relax and take it easy, and wonder why Russia is gaining on us. We're more concerned with clockwatching than in the products we turn out. We're simply not on the job full time! And the simple fact is that there is no substitute for hard work. Until we realize this we are in grave danger.

★ modern machine shop ★

LOOK TO LAYOUT

Providing a plant for a small company is like buying an expensive suit for a 13-year-old boy — if all goes well both will outgrow their clothes in a short time—according to a new booklet being made available through the Small Business

COLDPOINT

"The drill that hasn't been stopped yet"

Material	Hole Diameter	Hole Depth	Drilling Time
Bearing Bronze	1/4"	3"	6 sec.
Cast Iron	7/16"	1"	3.8 sec.
Formica (Glass type)	7/16"	1 1/4"	3.3 sec.
303 Stainless	7/16"	4"	42 sec.
316 Stainless	7/16"	3 1/2"	47 sec.
Rex AA Tool Steel	7/16"	4"	62 sec.
Rex M 2 Steel	7/16"	4"	47 sec.
4615 Steel (62)	7/16"	1/2"	3 sec.
Inconel	7/16"	3"	150 sec.
Monel-R	7/16"	4"	79 sec.
Ketos	7/32"	4"	237 sec.

COLD POINT DRILLS cut costs as fast as they cut metals.
Quotations on request. Delivery within four weeks.
Your competitors are sending for information on COLD POINT DRILLS, why don't you?

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. . . without chatter or bounce and deliver an overall efficiency that hand-ground burs can't possibly match. P&W Kellerflex Burs are master machine ground . . . precision in every respect. Select the right burs for all your needs from a truly complete line that includes: high speed steel or solid carbide, 3 basic cuts, 4 shank sizes, 6 fluting types and 18 standard shapes (plus hundreds of specials). Write now for complete information.
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over the editor's desk . . .

Administration. In the rush of every-day activities many plant managers think of plant space requirements only when they run out of space, says the booklet which was prepared for the Agency by John R. Immer, formerly Professor of Industrial Management, The American University.

A little foresight in plant layout now, may save expensive moves later for the small business owner. The plant manager should know what his present actual space requirements are—the amount of net manufacturing space now available to him, and the amount of space which will be required at projected levels of expansion. The booklet takes a practical approach on how to improve a poor layout when present space is sufficient, or how to start from scratch and plan an entirely new operation. Various facts to be considered and steps to be taken in planning the move and scheduling the actual movement are discussed, whether it be a rearrangement within the present building or the building and equipping of a completely new factory.

All across the country small plants are growing, diversifying their production lines, increasing their production—but all too often the small plant just grows. Not enough consideration is given to the resulting layout, or to economical movement of materials, and the result is a hodgepodge of production machines,

material handling equipment, work in process, assembly lines and storage of completed goods.

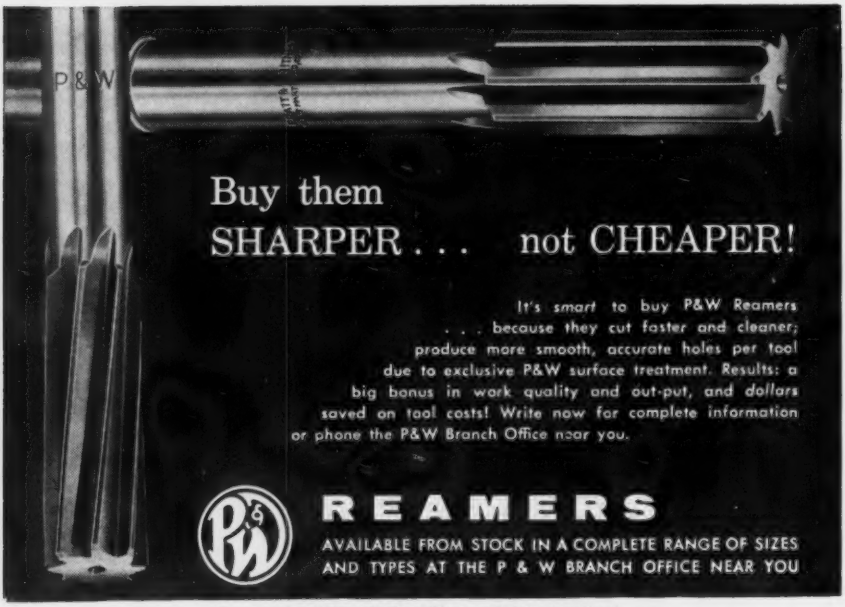
Eventually the small business owner realizes that costs of finished goods are rising, net profits are falling off, production is slowing down. A check of the situation shows that the basic cause is a lack of economical and orderly movement of production materials through the shop, resulting in excessive labor costs. This new booklet has been prepared to assist the owner who finds himself in this predicament and has decided to do something about it.

The booklet points out that the results derived from a new plant layout are often phenomenal. Lower materials handling costs, less travel for all materials, more convenient and efficient workplaces — all these results of a well planned layout permit production to flow with little friction. This not only saves money but makes life worth living for the plant manager faced with difficult production problems.

The booklet says that "Today's companies, both large and small, caught in the squeeze of higher prices and competitive price ceilings, must reduce costs to operate profitably. As the cost of individual units of production, both materials and labor, are probably rising during this period, more efficient methods and better layout of production facilities must be devised.

Profitable Small Plant Layout, is number 21 in the Small Business Administration's Management Series booklets, and can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 25 cents.

For more data circle 358 on Postpaid Card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REAMERS
AVAILABLE FROM STOCK IN A COMPLETE RANGE OF SIZES AND TYPES AT THE P & W BRANCH OFFICE NEAR YOU

For more data circle 359 on Postpaid Card

over the editor's desk . . .

SMALL-SHOP MANAGEMENT

The problem facing the chief executive in a small manufacturing company in the profitable management of his daily time received comprehensive and provocative attention during the recent 25th Anniversary Annual Meeting of the National Screw Machine Products Association at Chicago.

James K. Carroll, executive vice president of Brust Tool Manufacturing Co., Franklin Park, Ill., discussed "The Chief Executive's Job In A Small Shop" as part of the Management Seminars program at the NSMPA meeting.

Among Carroll's suggestions for better and more effective use of executive management time: Short, well-planned staff meetings, carefully prepared in advance and held rigidly to the agenda; Weekly reports from each member of the operating staff; Careful attention to the development of understudies for all key positions.

And the constant maintenance of the following data, on a monthly basis, in the Manager's office for quick reference:

New orders received, sales invoiced, volume of estimates, actual productive hours, hourly costing rates, hourly selling rates, manufacturing expense, selling expense, administrative expense, backlog in productive manhours, financial statement, average hourly wage rate chart and personnel directory.

Two very simple aids to plan-

ning and managing time for the chief executive, Carroll told the screw machine executives, are an "executive planning calendar" for use on the desk or on the wall as a schedule of appointments, meetings, target dates, and so on, and a simple "year book" with a space on each page for two day's entries. The purpose of the year book is recording telephone conversations and interviews with their date for later, and often vital, reference.

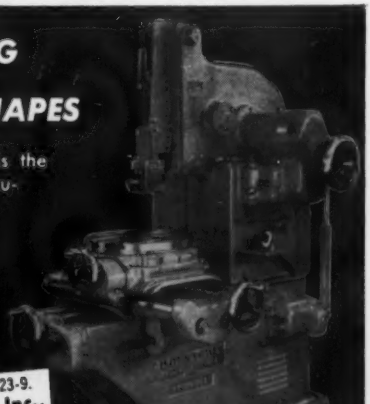
INVESTMENT SURVEY

Businessmen expect to invest $31 billion in new plant and equipment in 1958, according to the survey conducted jointly in late April and May by the Department of Commerce and the Securities and Exchange Commission. This is 4 percent less than the amount anticipated by business for 1958 in the survey reported three months ago, and 17 percent below the record $37 billion outlay in 1957.

The survey indicates that capital investment programs of business are expected to be at seasonally adjusted annual rates of $31.4 billion and $30.3 billion in the second and third quarters of 1958, respectively. These compare with the actual figure of $32.4 billion in the first quarter of this year, and imply that the decline will extend through the fourth quarter. The figures for the first and second quarters represent downward revisions from the programs which were reported previously, reflecting in part the severe weather conditions earlier this year, but also the adjustments of basic programs.

FASTER, EASIER HANDLING
FOR IRREGULAR WORK SHAPES

THE PRATT & WHITNEY VERTICAL SHAPER is the handiest machine in any shop. Powerful, accurate and versatile, it is much more than a slotter . . . handles a wide variety of irregular shapes with speed, precision and economy. Vertical design eliminates springing, insures permanent accuracy. Cutting action helps to hold work in place. Supplied in 2 sizes with 6" and 12" ram strokes.



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MACHINE TOOLS • GAGES • CUTTING TOOLS

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Slash Your Tooling Costs 6 Ways

To save you money, Sentry Electric Furnaces with Diamond Block Atmosphere Control bring you 6 important high speed steel tool hardening advantages.

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3. Controlled tool hardness.
4. Finishing operations eliminated.
5. Tool production increased.
6. Manufacturing tolerances improved.

Request catalog detailing further cost cutting advantages of the Sentry method. Send samples of your high speed or high carbon high chrome tools for a demonstration hardening.

304-8

Sentry TRADEMARK **ELECTRIC FURNACES**

Request Catalog **N-23** · *Write* **THE SENTRY CO., FOXBORO, MASS.**

For more data circle 361 on Postpaid Card

ARMSTRONG

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. . . in design, machining and strength; in completeness of line in both sizes and types.

Designs are based on a full knowledge of clamp uses and requisites. Drop forging assures die-perfect form, texture toughness and freedom from structural faults. Maximum stiffness is attained by a discerning selection of steels with accurate controlled heat-treating, tempering and testing.

For dependability and long useful life, specify and standardize on ARMSTRONG Drop Forged Clamps.

Write for new ARMSTRONG General Catalog showing almost 5000 industrial tools

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For more data circle 362 on Postpaid Card

CERAMIC TOOLING AID TO HIGH TEMPERATURE PROCESSING

Uses and advantages of ceramic materials in producing tooling for high temperature work are covered.

By HERBERT SCHWARTZ

At 2,000 degrees F. peculiar things start to occur to tooling. This has obsoleted to a great extent materials and designs formerly applied successfully to low temperature tooling such as milling fixtures. In this temperature range tools made of conventional steels will warp, oxidize, rupture or buckle. For this reason tool engineers have had to take a new and completely fresh approach to the vexing problem of high temperature machining.

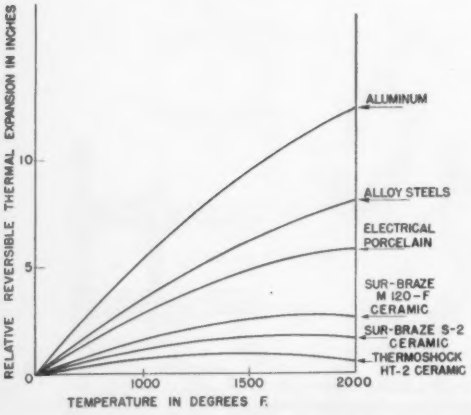

Fig. 1—Thermal expansion versus temperature for ceramic and metallic tooling materials.

High temperature problems started to hit the tool industry a few years ago, when missile manufacturers began designing components which had to operate at elevated temperatures. Obviously high temperature processing such as welding, brazing, soldering, sintering, heat treating and so on, would be necessary to produce these components. In addition to military requirements, other industries such as transistor manufacturers seeking to automate production or miniaturize the product turned to high temperature processes. Thus began the demand for the so called "hot" tools.

The failure of an expensive alloy steel brazing fixture to hold tolerances for one of its aircraft customers caused the engineers of Duramic Products, Inc. to take a long hard look at available materials. With encouragement from actual users, they turned to ceramics for a solution to the problem.

In any discussion of this type of ceramic tooling, the first question to be considered is: Why use ceramics for high temperature tooling? A clue to the answer may be found in the derivation of the name

"ceramic." It comes from the Greek "keramis," which freely translated means "burnt stuff." For our purpose, "ceramic" denotes a material which has been exposed to high temperatures and therefore has built-in heat resistance. For this reason ceramics possess extremely low thermal expansion rates, which means to the tool engineer, minimum warpage or distortion of the tool during rapid heating or cooling. Add to this the inherent wear resistance and dielectric strength possessed by ceramic materials, and you have a material with excellent potential for use in high temperature fixtures.

Obviously not all ceramic materials would be suitable, and experience has shown that it is necessary to tailor-make materials to meet the requirements for tooling which must operate at temperatures up to 3,000 degrees Fahrenheit.

Three such materials are Sur-Braze M120-F, Sur-Braze S-2 and ThermoShock HT-2 ceramics. All three are basically formulations of aluminum oxide, a material now finding use in industry not only for fixtures but also as a cutting bit material. Reference to the chart (Fig. 1) on which thermal expansion is plotted against temperature, shows that all three materials have in common a lower thermal expansion rate than most of the conventional tooling materials. Each material has characteristic properties which indicate its specific uses and serve to divide them into classes as follows:

(1) "Machining" Ceramic (for example Sur-Braze M120-F). This material is readily machined, using conventional machine shop methods and equipment, and then "fired" to produce a hard ceramic with heat resistance to 1,950 degrees Fahren-

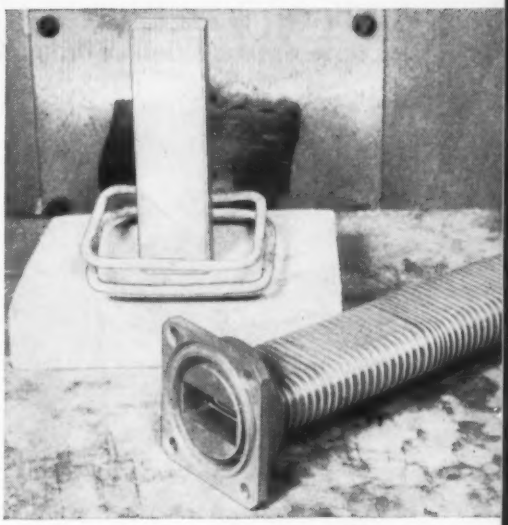

Fig. 2—View showing typical application of ceramic arbor in an induction heating setup.

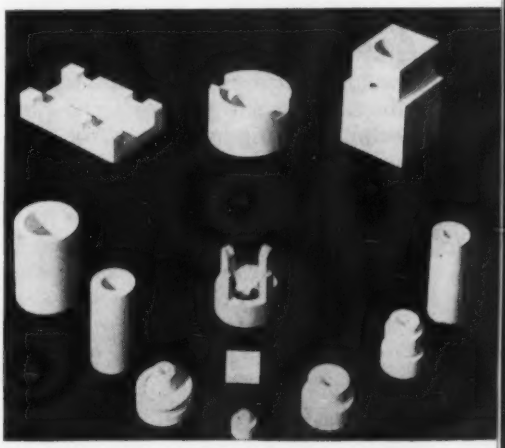

Fig. 3—Illustration showing other typical parts made for high temperature tooling work.

"The material can be machined to hold 'as fired' tolerances as close as plus or minus 0.002 inch . . . "

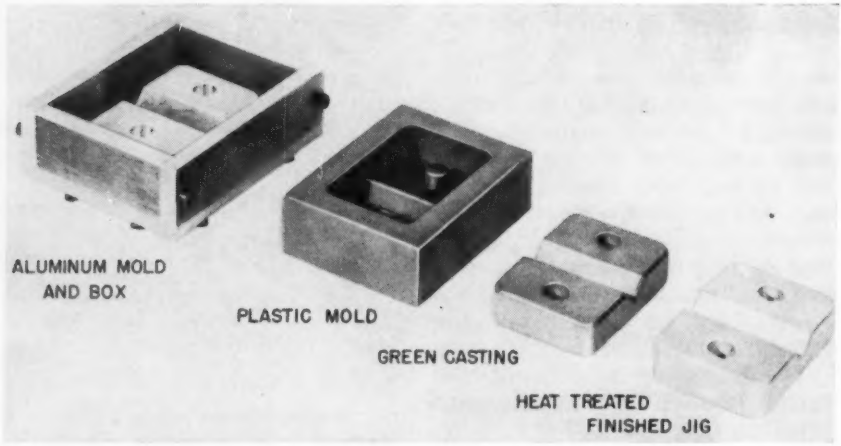

Fig. 4—Illustration showing four-step process for casting ceramic into heat resistant tooling.

heit. It can be machined to hold "as fired" tolerances as close as plus or minus 0.002 of an inch, and can be ground after firing to plus or minus 0.0001 of an inch.

This material has been found to be ideal for such applications as induction heating jigs, spot and projection welding locators, silver brazing fixtures, transistor alloying jigs and so on. Figure 2 shows a typical application of a ceramic arbor in an induction heating setup. The material doesn't warp under heat, does not absorb energy from the inductive field (since it is a non-conductor), and molten brazing alloys do not stick to the tool. In the application illustrated, the part being brazed is a critical waveguide assembly for a radar unit wherein it was possible to hold assembly tolerances to plus or minus 0.0005 inch. Figure 3 shows other typical parts made for high temperature work. It should be noted that in addition to fabricated parts this material has been made available in raw forms, rods, bars and flats, unfired and ready for further machining and final firing by the user. It lends itself to rapid production on a short or long run basis.

(2) "Casting" Ceramic (for example Sur-Braze S-2). This material is made into a slurry and cast in plastic molds, using a simple four-step process as is illustrated in Fig. 4. In addition to its ability to withstand temperatures to 3,000 degrees F. this material offers considerable savings in fabrication costs over conventional machined tooling. Aircraft manufacturers have found

"This material has tremendous resistance to rapid temperature changes such as encountered in water quenching from 2,200 deg. F."

extensive use for the material in welding and brazing fixtures. In one application, illustrated in Fig. 5, the cast ceramic fixture is used as a brazing fixture for brazing shroud and vane assemblies. The ceramic fixture cost $21.00 as compared to a cost of $435.00 for the previously used machined fixture, which incidentally, weighed three times as much as the ceramic tool.

"As cast" tolerances as close as plus or minus 0.005 inch are possible with this material. For closer tolerances a method has been developed for grinding to tolerances of plus or minus 0.001 inch after firing.

An interesting advantage in the use of this ceramic occurs when it is used in torch brazing operations where increased production rates are achieved. Since this ceramic material has a low thermal conductivity as compared to metal, it therefore contains the heat around the part being brazed.

This ceramic material is also available both as finished tools or in raw powders along with a plastic molding compound used in making the molds in which the ceramic material is cast.

(3) "Pressing" Ceramic (for example ThermoShock HT-2). This material is not available in raw form. Tools are fabricated to print specifications by the manufacturer using procedures similar to those employed in the fabrication of powder metal parts. In this case, a dry powder is pressed in a steel die, and then fired to hardness. The result is a low-cost, high temperature tool with excellent heat shock resistance. This material has tremendous resistance to rapid temperature changes such as are encountered in water quenching from 2,200 degrees Fahrenheit. The material derives its thermal shock resistance from its thermal expansion rate which is very close to zero over a 2,400 degree F. range.

At the present time production is limited to parts approximately two inches in diameter by two inches

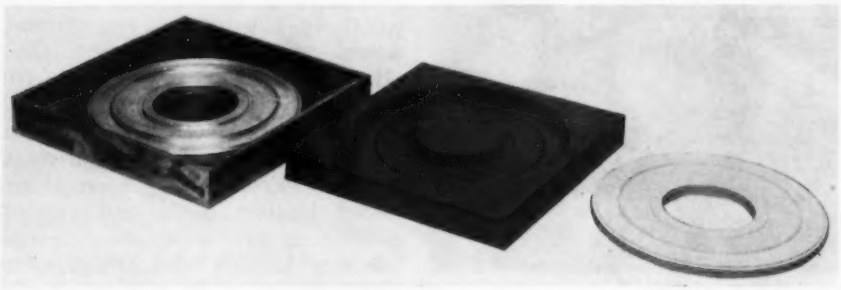

Fig. 5—Cast ceramic fixture (right) used in brazing aircraft shroud and vane assemblies.

"Ceramics are poor in bending stresses but exhibit excellent compressive characteristics."

long. The material will lend itself to a wide variety of high temperature tools in which extreme heat shock resistance is necessary, such as weld backup plugs, copper brazing stop-off plugs, induction brazing jigs and spot and projection welding locators. Figure 6 shows some typical parts made from this material. In addition to heat shock resistance features, this material has the interesting advantage of not being "wet" by molten metals. An appliance manufacturer recently selected locators made of this material in aluminum brazing thermostaticly-controlled frying pans because of the material's ability to resist sticking to molten aluminum.

A direct conversion from a metal tool design to one in ceramic is not always possible. The following are some of the problems which must be considered:

(1) Ceramics are poor in bending stresses but exhibit excellent compressive characteristics. In all cases, therefore, fixtures should be designed to load the ceramic in compression.

(2) The feature of low thermal expansion in a ceramic tool must be accounted for by allowing sufficient clearance at temperature between adjacent and inserted relatively, highly expansive metal parts. Failure to consider this will cause jamming or breakage of the ceramic tool at temperature.

(3) Sharp corners, rapid changes in cross section and so on, should be avoided. These points become "heat stress concentration" points, where resultant differences in heat dissipation during cooling can possibly cause cracking.

Figure 7 illustrates these design considerations. The fixture shown is a furnace silver brazing tool used by an aircraft parts manufacturer in brazing 4340 steel lever assemblies. The 7 inch by 1½ inch fixture holds eight assemblies. Note that the hardware is made of Inconel, since its construction in ceramic would offer no advantages. The clamping elements are made of ceramic material because of their contact with the molten alloy. Note also that the ceramic is compression loaded. Threads have been eliminated. Instead a pin and nut arrangement, with adequate clearance between Inconel bolt and hole in the ceramic, loads the ceramic in compression. An ingenious quick-

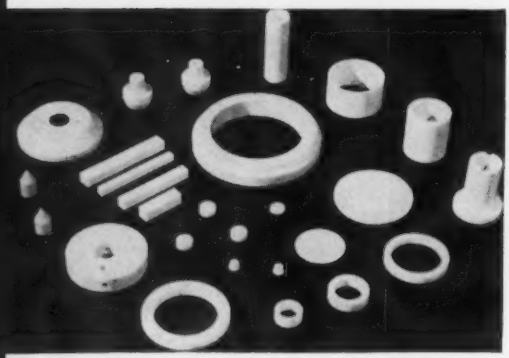

Fig. 6—Typical ceramic parts for applications requiring high heat shock resistance.

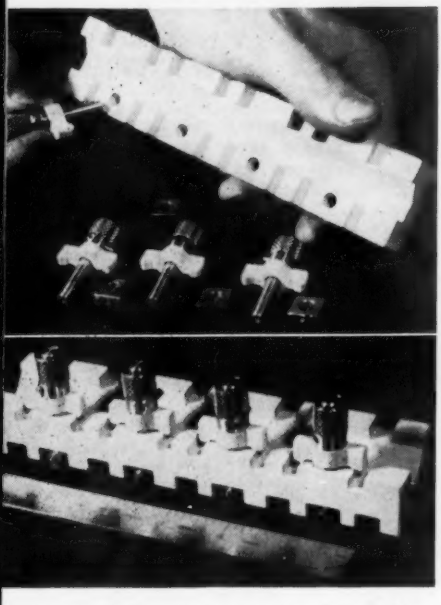

Fig. 7—Ceramic fixture used in furnace silver brazing steel aircraft lever assemblies.

acting cam holds the assemblies in the ceramic exerting positive pressure throughout the brazing cycle.

High temperatures have opened a new field for the tool designers and fabricators. Ceramic tooling has in many cases offered solutions to the problems unique to this field. New materials and new fabrication and design techniques are being constantly developed to meet the challenges now being offered in this new tooling industry.

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Broaching Film

Designed for viewing by engineers, a 16 mm. 30-minute color-sound film entitled "Precision Broaching for Production and Profit," has been released by The Lapointe Machine Tool Company. The film starts out by showing the operation of simple, basic broaching machines and continues its illustrations on through to the most intricate, fully-automatic high-production machines, many of them adaptable to automation. There are many close-up views of broaching tools and broaching fixtures in operation. Close-tolerance forms, requiring utmost precision, are shown being broached without wasteful scrap.

The film is available, without charge, with or without a Lapointe engineer, to any company or organization wishing to use it. Inquiries should be addressed: Director of Educational Program, The Lapointe Machine Tool Co., Hudson, Mass.

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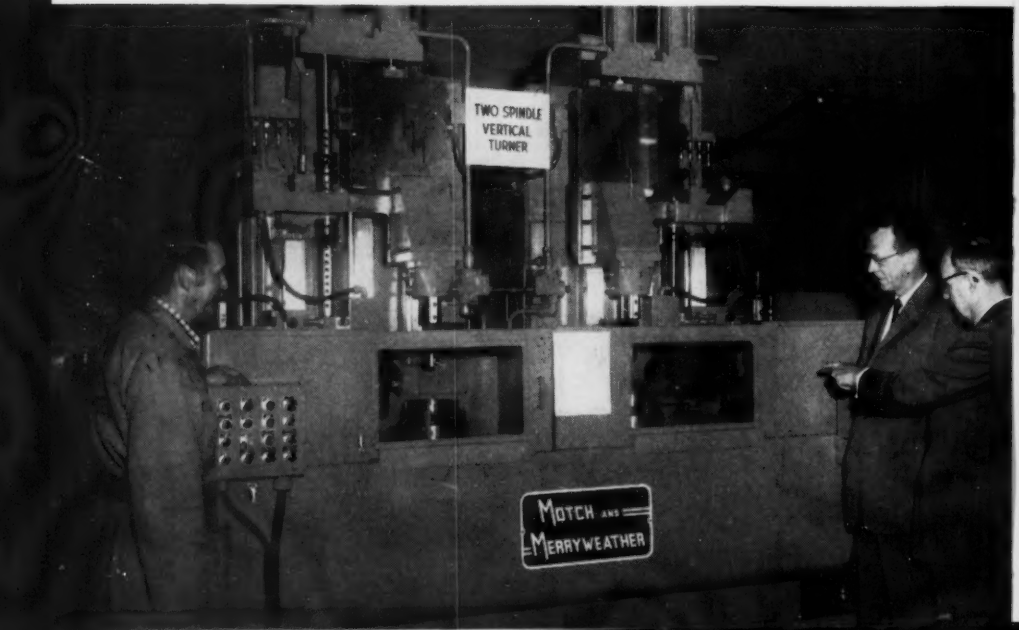
"Everything I make turns out fuzzy looking."

Demonstration and Display Features Latest Tools and Equipment

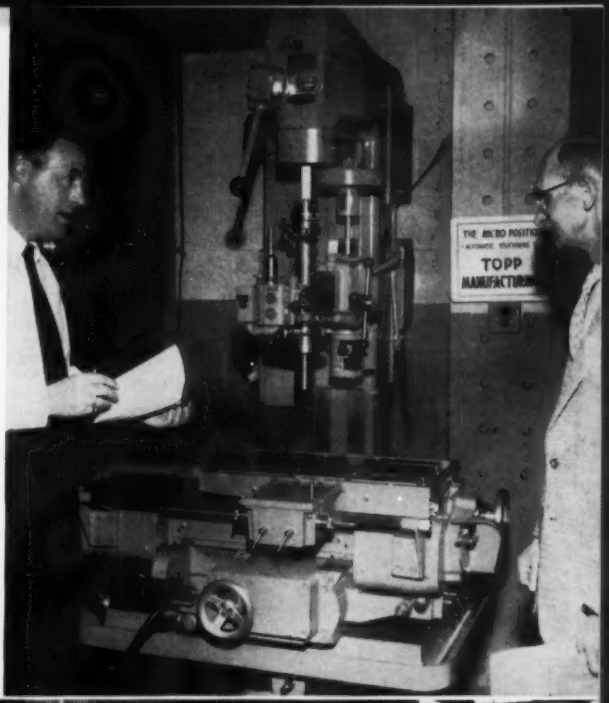
LAST month, hundreds of production executives from manufacturing plants all over the Middle West were given the opportunity to see demonstrated more than sixty machine tools that have been designed to produce better workpieces, faster and at a lower cost. Accompanying the machine demonstration was an accessory equipment display, all under the roof of the new Cleveland plant of The Motch & Merryweather Machinery Company. The accompanying illustrations show graphically only a small portion of the exhibits but a large portion of interest. The complete list of machine tool builders and machine tool accessory manufacturers who took part in the demonstration and display included the following:

A & C Engineering Co.
American Sip Corp.
Avey Division
Blanchard Machine Co.
Buffalo Forge Co.
Cincinnati Bickford Division
Cleveland Instrument Co.
Collins Microflat Co.
Danly Machine Specialties, Inc.
Davenport Mach. Tool Co.
Davis Boring Tool Division
Futurmill, Inc.
Giddings & Lewis Machine Tool Co.
George Gorton Machine Co.
Gould & Eberhardt, Inc.
Kaukauna Machine Division
McPherson Broach Co.
Moline Tool Co.
Motch & Merryweather Mfg. Division
Motch & Merryweather Cutting Tool Mfg. Division
Nesen Diamond Tool Co.
Norton Co.
Oster Mfg. Co.
Production Machine Co.
Springfield Mach. Tool Co.
Torrington Co.
V & O Press Division
Webber Gage Co.

Machine operator Ed Bailey at left conducts demonstration run on new Motch & Merryweather two-spindle, vertical, precision production turning machine as Don M. Pattison, (Right) General Manager of Manufacturing Division, The Motch & Merryweather Machinery Company, discusses with A. J. Jones, Director of Engineering, the fast turning, boring and facing operations being performed on an 8-inch diameter gear blank workpiece.



Don M. Patterson, (Left) Vice President, The Motch & Merryweather Machinery Company, explains to Ralph J. Brickner, Machinist, Cleveland Electric Illuminating Company, the features of the Avey No. 2 BMA automatic cycle drilling machine equipped with a Micro Positioner, the precision automatic positioning table which is produced by the Topp Manufacturing Company.



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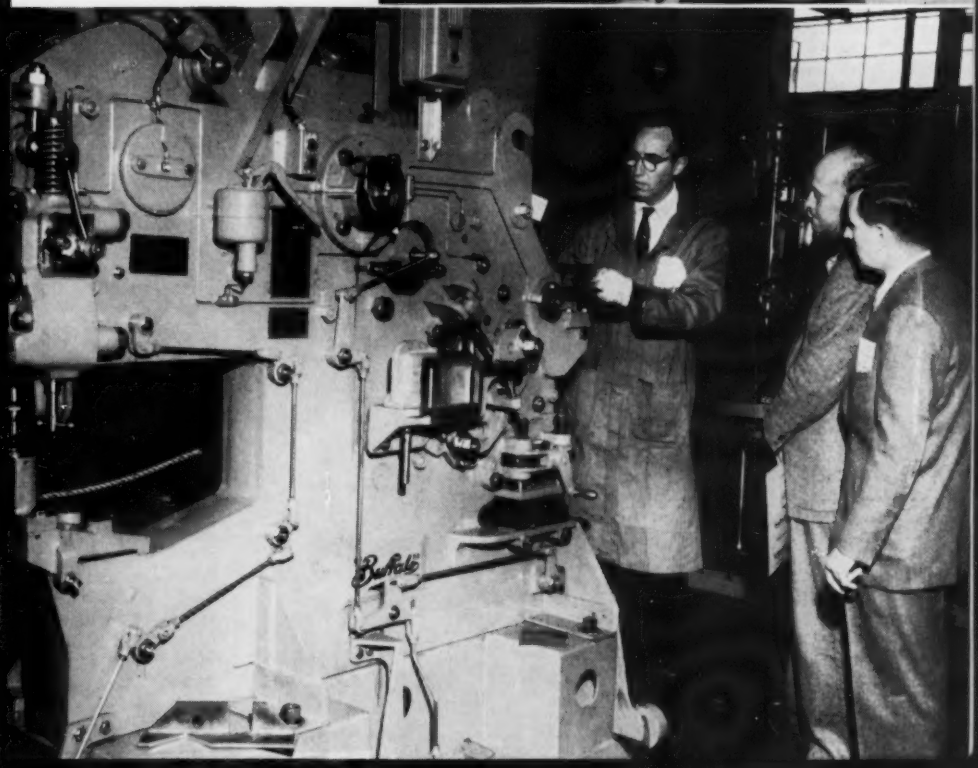
C. H. Locke, (At Machine) Sales Engineer, Buffalo Forge Company, demonstrates to Victor Austin and Frank Lucas, Foreman, Machine Shop, National Tube Division of United States Steel Corporation, the versatility of the Universal Iron Worker designed for punching, bar or angle shearing, plate slitting, coping and notching operations.



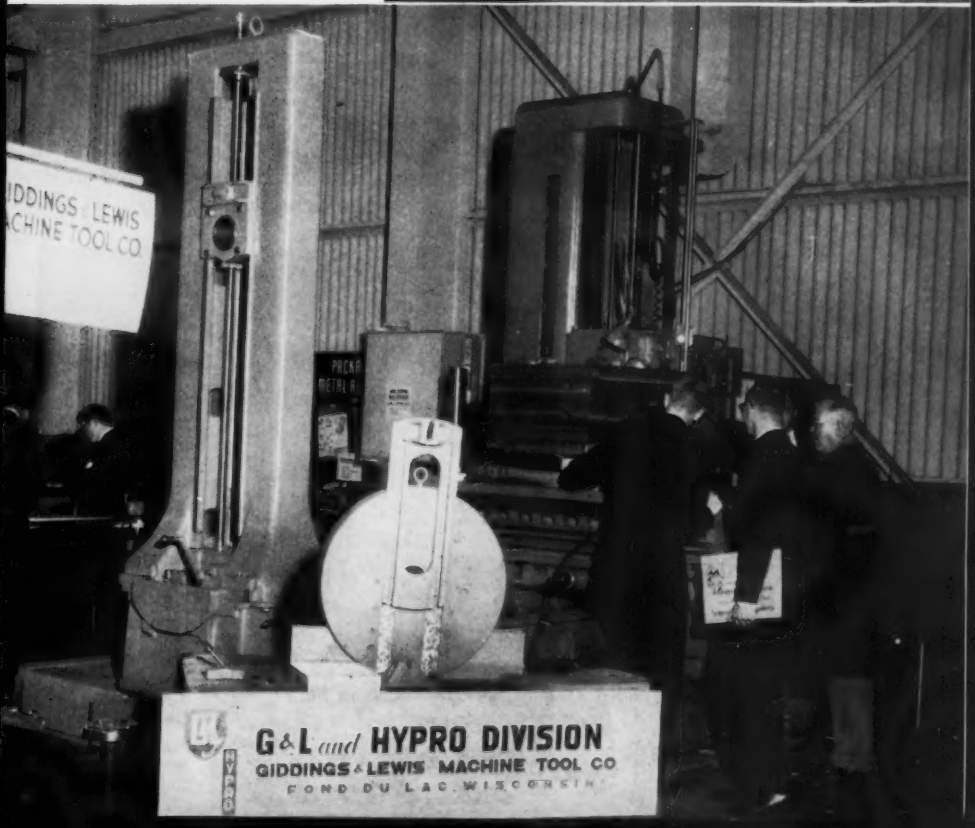
George Pratt, Demonstrator, The Blanchard Machine Company, points to Size Control Caliper as Ken Powell, (Left) Sales Engineer, Pittsburgh Office, The Motch & Merryweather Machinery Company; C. T. Cunningham, Sales Engineer, The Blanchard Machine Company; and R. L. Ardinger, (Right) General Foreman, Edgar Thomson Works, U. S. Steel Corporation, view No. 18-C Blanchard Grinder.

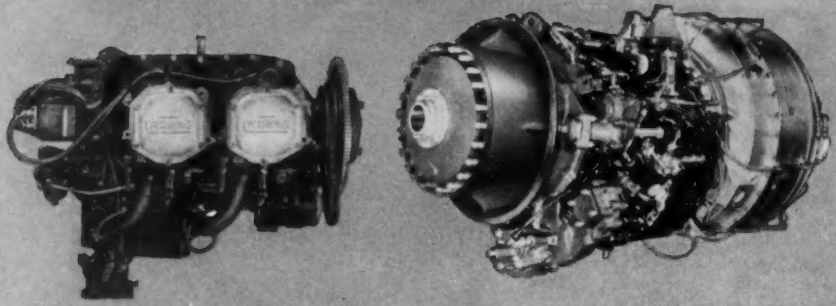
A. B. Gangloff, (Right) Sales Engineer, The Motch & Merryweather Machinery Company examines with H. L. Pickett, also a Sales Engineer, the operation of Feed-O-Matic unit on Danly, 35-Ton, Inclinable Press.

• PANTOGRAPH MACHINES
• 2-2B PLAIN KNEE TYPE MILL
• 3-4B VERTICAL KNEE TYPE MILL
• 1-2Z MASTERMIL
• 5-J TRACEMASTER
• 3T6-4 CUTTER GRINDER

Watching C. Converse, Service Engineer, George Gorton Machine Co., operate Gorton Model P2-3 Tracer Controlled Pantograph Engraving Machine, are, (Left to Right) W. Willson, Senior Process Engineer and Process Engineers, Ray J. Butters, D. Lanius, L. Bolton, P. Clapp, and C. Richmond all of the Detroit Diesel Engine Division, General Motors Company.

(Right) Joe Travis, General Foreman, A. Coscolenda, Chief Tool Engineer, and Steve Dier, Development Engineer, all of Thompson Products Corporation, listen intently to N. Simat, Engineering Departmet, Cincinnati Bickford Division, Giddings & Lewis Machine Tool Company, explain complete and partial pre-selection, and lever shift control, features of Cincinnati Bickford Super Service Radials. (Below) James Andrew, Student, with his father Lowell, a Project Engineer with the Yoder Company, and R. A. Riefer, Manager, Pittsburgh Office, The Motch & Merryweather Machinery Company, observe Russell Johnson, Factory Representative, Kaukauna Machine & Foundry Division, Giddings & Lewis Machine Tool Company, as he explains features of Model 340-T Table Type G&L Horizontal Boring, Drilling and Milling Machine.





(Left) Lycoming O-320 high-compression 4-cylinder aircraft engine. (Right) T-53 gas turbine.

Building Lycoming Engines

The second installment of a three-part article outlining the machining operations performed in producing various model aircraft engines.

By EDWARD J. BERTRAND
Supervisor of Machining,
Lycoming Division, Avco Manufacturing Corporation

The illustration Fig. 9 shows the set up of tools used to finish-mill the inside surface of the exhaust port. The machine is a Cincinnati three-spindle miller, equipped with three fixtures and a tracer, the work-holders being linked to the driving mechanism of the

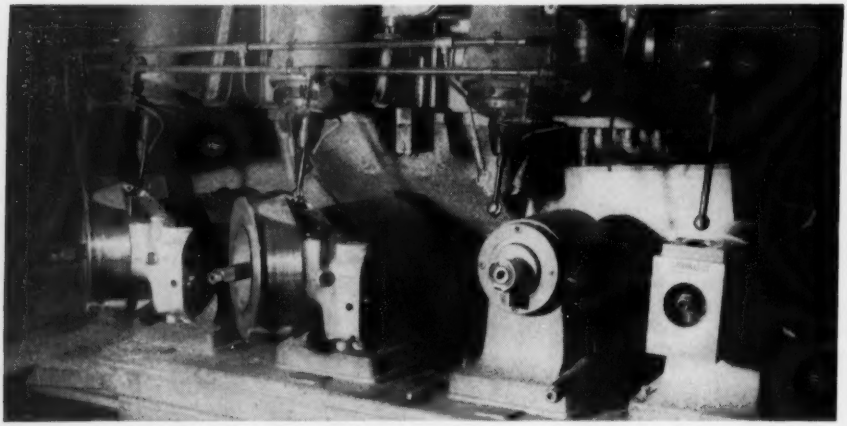


Fig. 9—"Rock-and-roll" setup used for contour-machining the insides of exhaust ports.

Fig. 10—(Left) Rough exhaust port casting. (Right) Finish machined exhaust port.

machine so that they can be actuated to produce an oscillating motion in two planes, resulting in a "rock-and-roll" motion.

As shown, the cutters are spherical, and when the machine is in operation the feed and motion of the cutters is controlled by a spherical tracer guided by a template formed to produce the desired shape in the work.

The exhaust port is located in the fixture by fitting the exhaust valve hole over an arbor on the rocker box face of the fixture, and is clamped through the exhaust valve guide hole. The spherical cutters are 0.990/1.000 inch diameter, each equipped with a ½-inch shank. In operation, each cutter produces a finished surface on the circular periphery of the intake and exhaust port in which it is working.

A rough exhaust port casting is shown at the left in the illustration Fig. 10, with a finished piece at the right. An inside view of the piece is shown in Fig. 11. A limit of 0.020 inch is permitted in this operation.

The inside diameters of the arm bushings in the trunnion for the propeller shaft must be maintained to critical dimensions, therefore each hole is bored individually, using the equipment shown in Fig. 12. The machine is a Heald Borematic, equipped with a Detroit gear grinder index head, using a diamond boring tool.

As shown in the drawing Fig. 13,

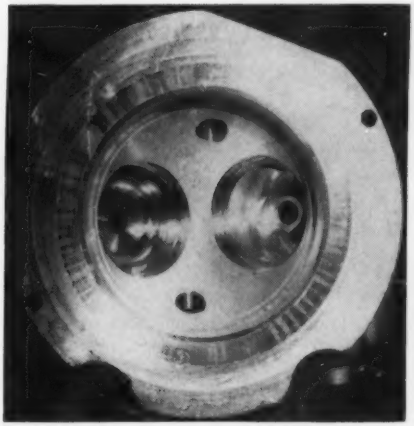


Fig. 11—Interior view of finished port.

"The diamond boring tool produces a mirror finish, accurate within 0.0005 inch."

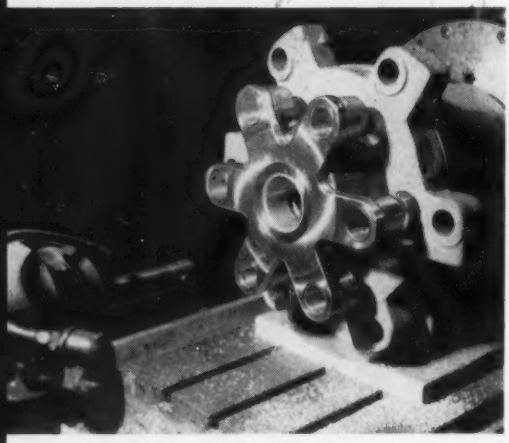


Fig. 12—Finish-boring trunnion arm bushings for the propeller shaft, using a diamond boring tool. Work is mounted on index head and each hole is bored individually.

the bores are held to diameters of 1.3980/1.3985 inch, and the center distances are held to 5.001/4.999 inch. The distance from the center of the piece to the center of each hole is held to the same dimension. The gear grinder index head is mounted on a traverse table to aid in maintaining accuracy. The diamond boring tool produces a mirror finish, accurate within 0.0005 inch.

The drive from the crankshaft to the propeller shaft of the Lycoming-produced engine involves the use of a set of 20 case-hardened steel pinions that are mounted on trunnions on a carrier. To obtain the accuracy necessary for extreme smoothness of operation, drawing

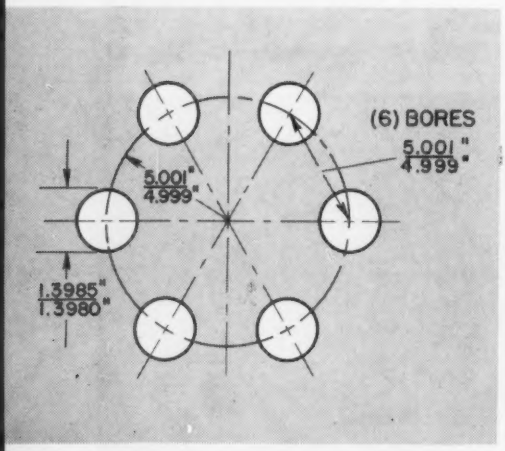


Fig. 13—Drawing showing dimensions and tolerances on trunnion arm bushings for propeller shafts, such as shown being finish bored in illustration Fig. 12 above.

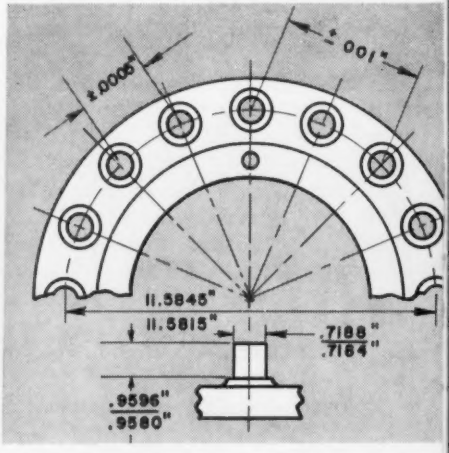


Fig. 14—This drawing shows the spacing and the dimensions of trunnion on a reduction gear pinion carrier of the design illustrated in Fig. 15 on the opposite page.

". . . the tolerance between any two trunnions cannot exceed plus or minus 0.001 inch."

specifications call for the trunnions to be ground to a diameter of 0.7184/0.7188 inch, with diameters to be circular, parallel, and straight within 0.0005 inch. The length of the trunnion is held to 0.9580/0.9596 inch, as shown in the drawing Fig. 14.

The center distance between adjacent trunnions is held to plus or minus 0.0005 inch, and the tolerance between any two trunnions cannot exceed plus or minus 0.001 inch.

The finishing of the trunnions is accomplished by grinding in a Bryant chucking grinder, the piece being held on an indexing fixture as shown in the illustration Fig. 15. Each trunnion is finished to size,

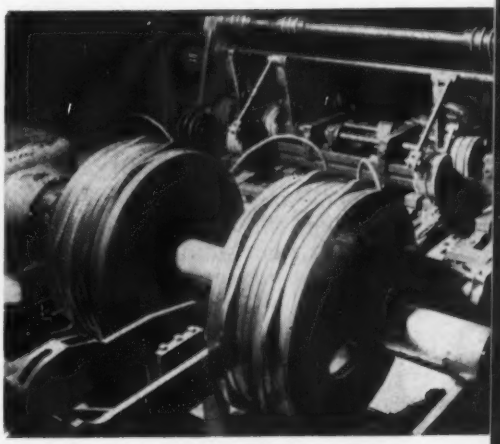


Fig. 16—Two intake and exhaust cams are mounted on a single arbor in a Norton Cam-O-Lap to have the cam tracks and the lobes super-finished to micro-inch specifications.

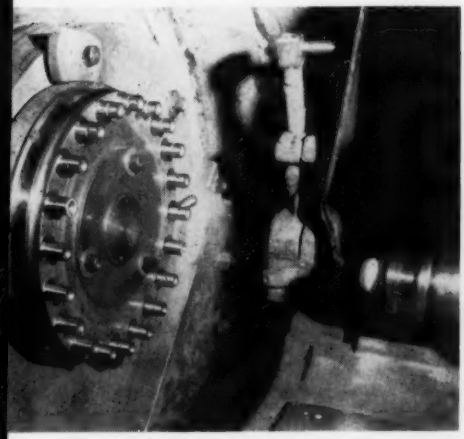


Fig. 15—Shown here is a Bryant chucking grinder equipped with an indexing fixture for use in the finish-grinding 20 trunnions on a reduction gear pinion carrier.

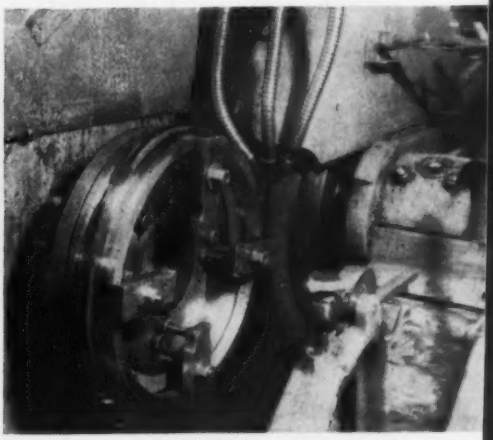


Fig. 17—Setup for grinding the intake and exhaust cams to the correct thickness and maintaining the spacing between them, using the "plunge-cut" method of grinding.

". . . the surfaces to be finished are fed into contact with superfinishing strips of emery cloth . . ."

then the next trunnion is indexed into position for grinding.

After the cam tracks and lobes on the intake and exhaust cam have been ground to drawing specifications, they are polished in a superfinishing machine to obtain extreme accuracy and smoothness. For this operation, two cams are loaded on an arbor that is swung between the centers of a Norton "Cam-O-Lap," as shown in Fig. 16, and the surfaces to be finished are fed into contact with superfinishing strips of emery cloth that are driven past the work at polishing speed. The exact contour of the cams is maintained by the use of a master cam and follower, which controls the oscillating movement of the finishing roll mechanism.

From 0.0002 to 0.0005 inch of material is removed in this operation, and the surfaces are polished to micro-inch specifications.

The cam tracks on the intake and exhaust port cams are separated by grooves which originally were cut with form tools in an engine lathe and finish-ground in a horizontal grinder using a single grinding wheel. The present method of cutting these grooves, using the machine shown in Fig. 17, has eliminated the turning operation.

The workpiece, which is of forged steel, is clamped to a fixture upon which it is centered by the finished inside surface of the piece. The machine now employed for this operation is a Norton external grinding machine, using two wheels that are spaced to the dimensions shown in the drawing Fig. 18 and

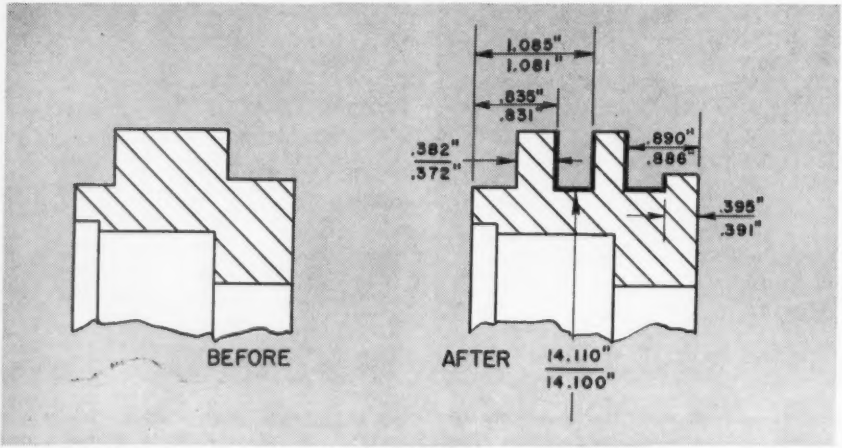


Fig. 18—Drawing showing dimensions of intake and exhaust cams and surfaces to be finished.

are mounted on an arbor to grind as a single wheel.

Using the "plunge-cut" method, the wheels are fed in, grinding from the solid, until the correct depth has been reached. Thus the operation is completed in one pass of the wheels, instead of the two passes formerly required. The heavy lines in the drawing Fig. 18 indicate the surfaces to be finished.

(To be concluded in next month's issue)

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The Metallurgy of Vanadium. By William Rostoker. Published by John Wiley & Sons, 440 Fourth Ave., New York 16, New York. Page size, 5¾ by 9 inches. 186 pages. Cloth bound.

This is a highly technical book devoted solely to the treatment of the metallurgical aspects of vanadium and vanadium alloys. In the nature of things one would either be interested in the subject or he would not. If so, then this is the book on the subject. Concisely but thoroughly, the subject is covered. The treatment replete with charts and photos is effective.

All phases of the subject are covered. The physical and mechanical properties, the extractive metallurgy and technology of vanadium are discussed as well as the constitution of alloy systems and the mechanical properties of the alloys of vanadium. Oxidation, corrosion and embrittlement and the metallography of the material are covered.

This second book in the Wiley series on the science and technology of materials, sustains the good impression that has been already created and augers well for the future.

FREE REPRINTS

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

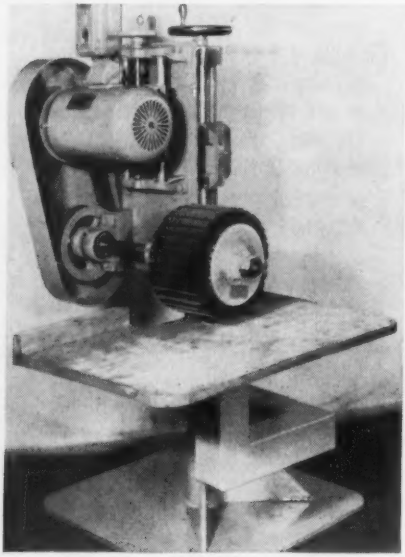
"Machine Tool Distributing and Engineering Services"
"Grinding Jet Blades by Abrasive Belt Method"
"Automatic Drill Feeds Speed Production"
"Industrial Distributors—Their Vital Service to Industry"
"Forming Aerodynamic Structures"
"Modernize Your Shop and Save Money"
"Producing Critical Airplane Control Components"
"Chill-Shunt Tooling in Tungsten Arc Welding"
"How and Where to Use Hydraulic Tracers"
"Cold Point Drilling"
"Fine Particle Wet Blasting and Metal Removal"
"Converting a Grinder to Increase Production"
"How to Guarantee Your Own Success"
"Relief Grinding Twist Drills for Spotfacing"
"Magnetic Chuck Facilitates Drilling Operations"
"Unique Tooling Setup for Gun-Drilling"

modern machine shop
431 Main St., Cincinnati 2, Ohio

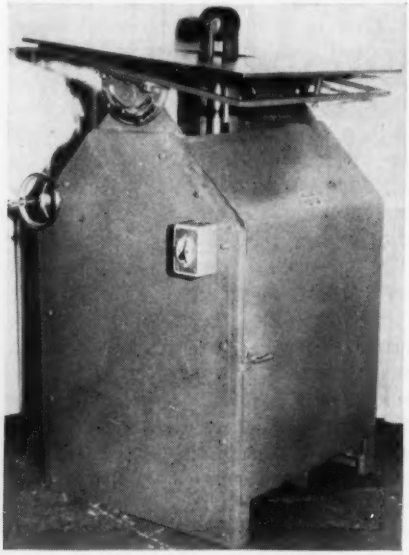
Newest Developments Revealed at Coated Abrasive Machinery Show

Production men put new developments to actual production line testing at Behr-Manning Plant.

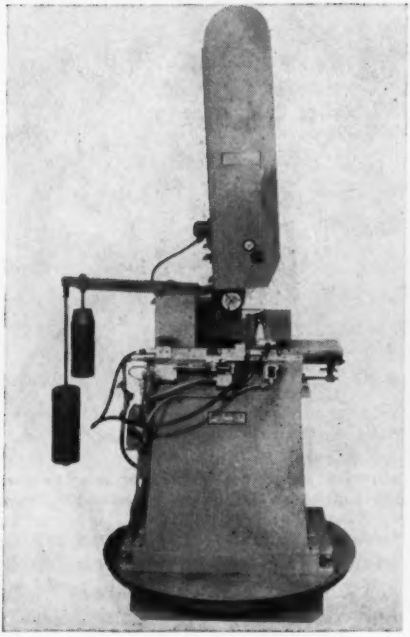
The importance of coated abrasives as a basic industrial tool was emphasized last month when 150 new abrasive machines were viewed and tested by several thousand industrial production men from all parts of the United States and half a dozen foreign countries. The occasion was the 3rd National Coated Abrasive Machinery Show, spon-



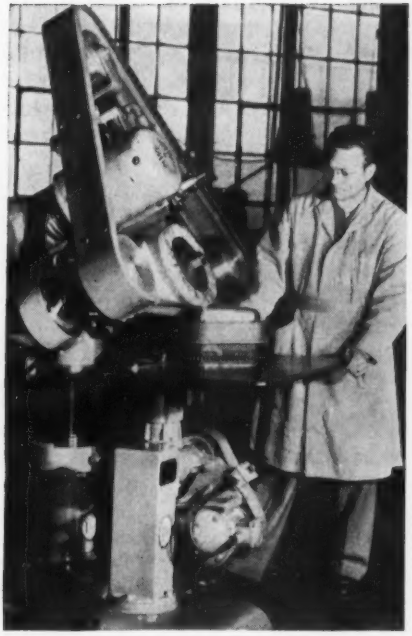
Made for concave and convex contours this tongue sander, a product of Bush Manufacturing Co., is equipped with a tilting polishing head and tilting table. The contact wheels are 1/4 inch in diameter and they may be either yoked or yokeless.



Adjustability on three axes is the outstanding feature on this Vonnegut head machine, made by Grinding and Polishing Machinery Corporation. It can be positioned to any angle and to any location of the work surface in relation to the table, as desired by the operator.



Contoured workpieces are held against coated abrasive belt by a powered chuck on this Divine Brothers machine. Shaped contact wheel makes belt conform to workpiece. Flat surfaces can be polished by substituting platen for the shaped wheel.



Blending radii on 3,600 jet engine blades per day is one of the accomplishments of this rise-and-fall belt polisher, a product of Abrasive Machinery, Incorporated. A reciprocating work-table carries the work past the cam-controlled contact wheel.

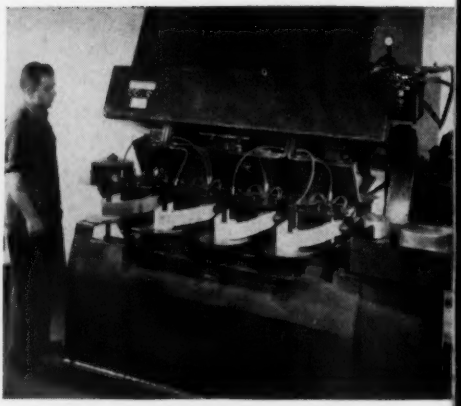
sored by Behr-Manning Co., a division of Norton Company, at its new $1,000,000 Product Engineering building in Troy, New York. The abrasive manufacturer acted as host to the machinery industry, inviting machine manufacturers to demonstrate developments of the past two years.

Production men from all phases of the metalworking, woodworking, furniture, plastics and other industries brought actual workpieces, using them to subject the new machines to comparative testing of their grinding and polishing performance. Among show visitors were large groups of supervisory men from grinding and polishing departments of large automobile manufacturers, aircraft firms, government arsenals and others.

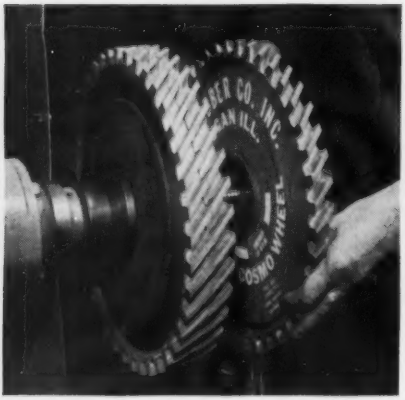
Among significant advances in machine tool design, particularly among machines whose weight was measured in tons, was a conspicuous "beefing up" of frames, bearings and drive trains to keep pace with improvements in abrasive belts and with the increasing forces being ex-

erted in heavy stock removal, descaling and similar work. More attention was also paid to flooding the work areas with coolants, and to more thorough filtration to remove grinding swarf and other contaminants from the coolant flow — a benefit whose close tolerances must be held in producing low micro-inch finishes.

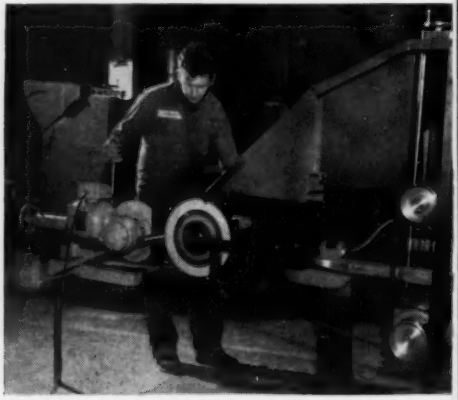
Features included a 150 h.p. grinder using a 50 inch wide abrassive belt for mechanical descaling and heavy stock removal; a 40-foot longitudinal polisher for tube, bar and extruded sections; an 11½ ton woodworking sander which dimensions and finishes in a single pass; a centerless grinder with fully automatic gauging; and a rubber roll grinder able to hold 0.001 of an inch tolerances on rolls of face widths up to 80 inches. Also demonstrated were a 1,000 gallon sub-floor filtration unit with an automatic elevator to deposit wastes in a disposal tank, efficient new dust-collection systems, and a belt storage room held to



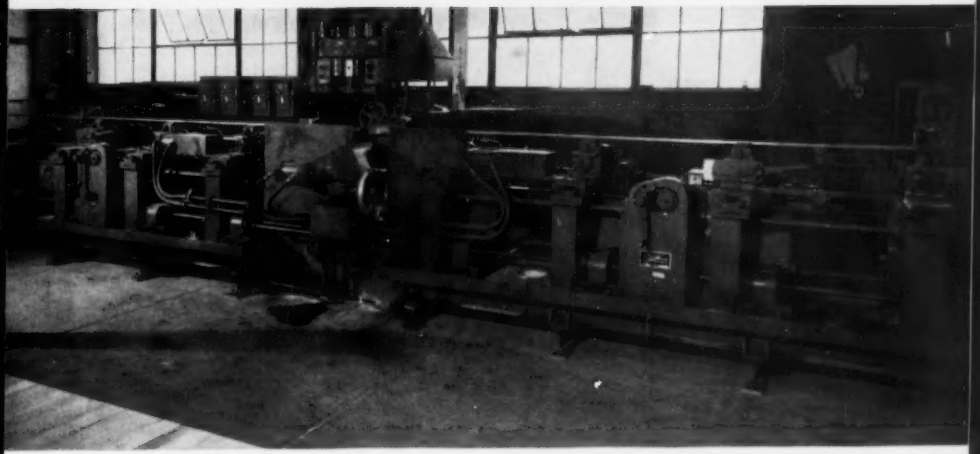
Strip and tube stock are polished longitudinally by this machine built by Kearsarge Engineering Corporation. It indexes abrasive roll stock to a variable number of workpoints each supported by platen.



These one-inch-wide contact wheels made by Chicago Rubber Co., Inc., may be ganged to any desired width. They are called R-58 Cosmowheels. Deep serrations allow these wheels to conform to odd-shaped contours that are found on many products. One such typical application is die casting polishing.



As shown here this centerless polishing machine can be set up by attaching the accessory unit to the standard Bader Space-Saver polishing pack. The unit, which will accept work from ¼ inch to 14 inches O.D., has rubber drive wheels which rotate and feed the workpiece. The feed rate is variable.



On this heavy-duty centerless grinder, coated abrasive belts serve to feed as well as grind the work. Traverse reversing does away with the need for returning long pieces to the infeed end of the machine, and powered fixtures at each end drive rolls which aid in feeding heavy workpieces. A wide choice in the selection of contact wheel and belt allows variation from heavy stock removal to micro-inch finishing. Production Machine Company, Greenfield, Mass., is the manufacturer of the particular machine illustrated.

ideal conditions of temperature and humidity.

The following pages of pictures and list of makers of grinders, polishing and buffing and accessory equipment who participated in the Show will give some idea of the comprehensive coverage provided by the Show and the excellent source of practical, helpful data afforded those who were privileged to attend the Show:

AUTOMATIC POLISHING MACHINES
Acme Manufacturing Co., Detroit, Mich.; Divine Brothers Co., Utica, N. Y.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.

BACKSTAND IDLERS
Fenlind Engineering Co., Rockford, Ill.; Rockwell Manufacturing Co., Delta Power Tool Div., Pittsburgh, Pa.; Divine Brothers Co., Utica, N. Y.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Standard Electrical Tool Co., Cincinnati, Ohio.

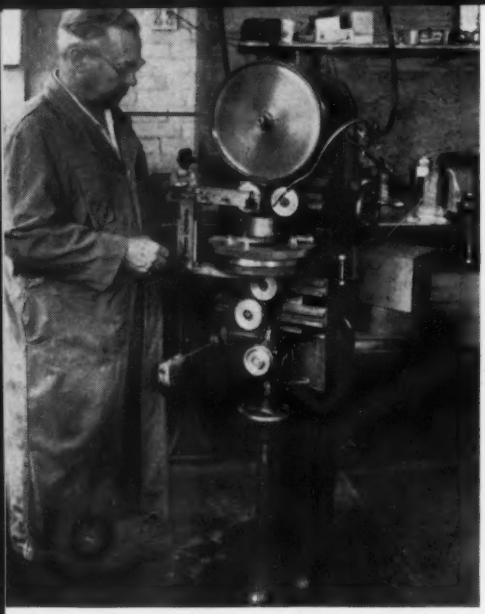
BENCH POLISHERS AND GRINDERS
Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Engelberg, Inc., Syracuse, N. Y.; Rockwell Manufacturing Co., Delta Power Tool Div., Pittsburgh, Pa.; Ryman Engineering Co., Ellwood City, Pa.

CENTERLESS GRINDING AND POLISHING MACHINES
Stephen Bader & Co., Valley Falls, N. Y.; Engelberg, Inc., Syracuse, N. Y.; Production Machine Co., Greenfield, Mass.

CONVEYORIZED GRINDING AND POLISHING MACHINES
Divine Brothers Co., Utica, N. Y.; Engelberg, Inc., Syracuse, N. Y.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.

DISC POLISHING AND GRINDING MACHINES
Rockwell Manufacturing Co., Delta Power Tool Div., Pittsburgh, Pa.; Jarvis Corp., Middletown, Conn.; R. G. Haskins Co., Chicago, Ill.

DIE POLISHERS
Hartford Special Machinery Co., Hartford, Connecticut.



Extreme accuracy is obtained with a very narrow coated abrasive belt on the Heim die polisher, which grinds and polishes contact surfaces of round-core extrusion and draw dies. The machine is manufactured by the Hartford Special Machinery Co.

Abrasive Machinery Show . . .

EXHAUST SYSTEMS
American Air Filter Co., Inc., Louisville, Ky.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

EXTRUSION POLISHERS
Engelberg, Inc., Syracuse, N. Y.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.; MurrayWay Corp., Birmingham, Mich.

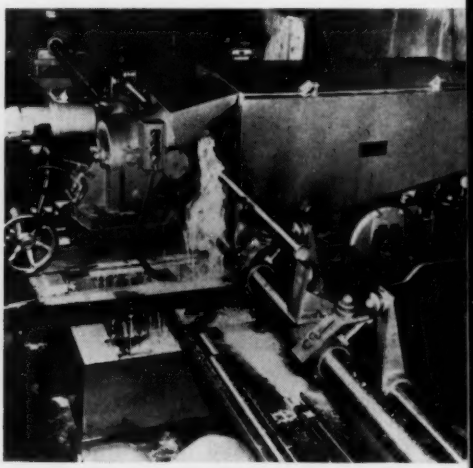
FILTERS
Industrial Filtration Co., Lebanon, Indiana.

MISCELLANEOUS
Acme Manufacturing Co., Detroit, Mich. (Roller Feed Unit); Behr-Manning Co., Troy, N. Y. (Model Abrasive Belt Storage Room); Union Tool Corp., Warsaw, Indiana (Union Vacuum Lift).

OFFHAND POLISHERS
Stephen Bader & Co., Valley Falls, N. Y.; Divine Brothers Co., Utica, N. Y.; Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Standard Electrical Tool Co., Cincinnati, Ohio.

OILS (CUTTING)
D. A. Stuart Oil Co., Chicago, Ill.; Sun Oil Co., Philadelphia, Pa.

Using a coated abrasive band on a rubber mandrel this Jarvis Corp. machine can be used to clean up difficult radii and so on.



This Engelberg Inc. heavy-duty centerless grinder is designed for precision work at high speed on rod or tube stock to 8 inches.

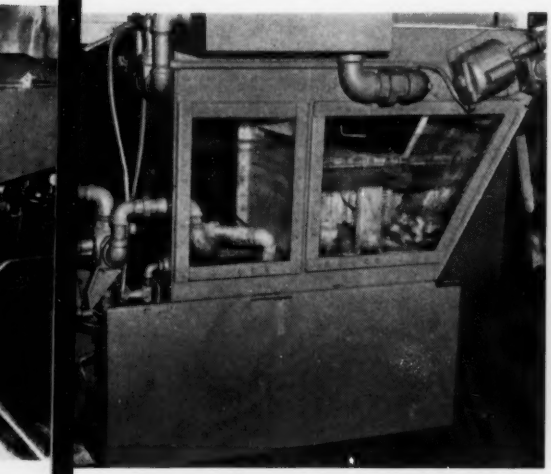
PLATEN GRINDERS
Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Walls Sales Corp., Brooklyn, N. Y.

PORTABLE TOOLS
Black & Decker Manufacturing Co., Towson, Md.; Brunswick Machine Tool Corp., Eagle Mills, Troy, N. Y.; Cleco Air Tools, Houston, Texas; Mall Tool Co., Chicago, Ill.; National-Detroit Corp., Rockford, Ill.; Porter-Cable Machine Co., Syracuse, N. Y.; Rotor Tool Co., Cleveland, Ohio; Skil Corporation, Chicago, Ill.; Stanley Electric Tools, New Britain, Conn.; Thor Power Tool, Aurora, Ill.; Sundstrand Machine Tool Co., Rockford, Illinois.

ROLL POLISHER
Hammond Machinery Builders, Inc., Kalamazoo, Mich.

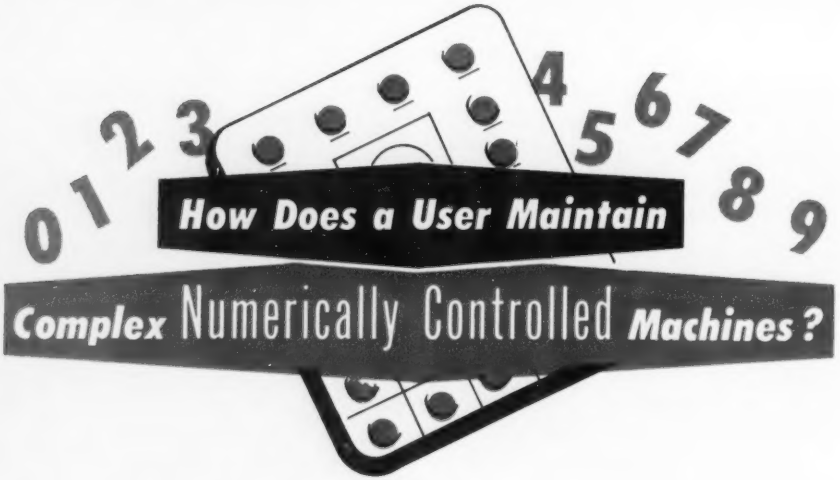
SHEET, STRIP, COIL AND BAR POLISHERS
Engelberg, Inc., Syracuse, N. Y.; J. M. Nash Co., Milwaukee, Wis.; Oakley Co., Inc., Bristol, Tenn.; Sherrill Machine Co., Statesville, N. C.; Union Tool Corporation, Warsaw, Indiana; Yates-American Machine Co., Beloit, Wis.; Hill Acme Co., Cleveland, Ohio.

This two-head flat finisher uses an abrasive belt as a conveyor and two belts, of different grits usually, as the finishing medium. It is built by Hammond Machinery Builders, Inc. and may be operated either wet or dry. Belts come in various sizes.



This big filter made by Industrial Filtration Company keeps coolant clean on two of the largest grinders at Behr-Manning.

Spirally-jointed coated abrasive bands are the grinding elements on these machines made by the R. G. Haskins Company.



Here's a timely discussion of a critical problem you may be called upon to face in the not-to-distant future.

By GILBERT C. CLOSE
Field Editor, Modern Machine Shop

Just what will be involved in organizing maintenance crews for numerically controlled machines? Will men with the special knowledge required be available, or will comprehensive and costly training programs be necessary? How will maintenance operations be conducted in order to keep down time on these costly machines at an absolute minimum and to assure they are operating at the maximum efficiency for which they are noted?

With these questions in mind, the author of this article decided to investigate the answers. It is apparent, even to the uninitiated, that before long numerically controlled machines will be common to all progressive machine shop production lines. They have long since passed the "gimmick" stage. They have proven their ability to produce faster and better than manually controlled machines of a similar type. In fact, in many shops producing highly complex and costly parts, numerically controlled machines are already spelling the difference between remaining competitive in this type of work or turning to less complex production.

The Convair (San Diego) Division of General Dynamics Corporation is an airplant that was a pioneer in the use of numerically controlled machines. Several AF furnished huge mills and skin mills, completely tape-controlled, are already in operation. More are being

installed or planned. The company is provided with the latest equipment for programming paper tapes and then transferring these paper tape programs onto magnetic control tapes. Experts who were pioneers in numerical control are directing these efforts. Most important of all, is that the numerically controlled machines are in constant operation, producing the highly complex components for which they were intended. It was evident that the Convair plant would be an ideal place in which to seek the answers to our questions about maintaining numerically controlled equipment.

With the full cooperation of Convair's Public Relations Department, a joint meeting was arranged with the men spearheading the numerical control program so that the subject of maintenance could be discussed from all angles. Step-by-step procedures on how a specific machine was maintained was not desired. Rather, an effort was made to establish a philosophy for the organization of maintenance crews for numerically controlled equipment, and to establish how Convair had utilized this philosophy in organizing their own crews and directing their efforts.

Two factors were emphasized from the first . . . First, that numerically controlled machines are as yet far from standardized and maintenance techniques are in a continual state of flux, and secondly, despite the present state of uncertainty, the continual modifications of equipment, and the non-standardization of operational and maintenance techniques, the numerically controlled machine is on its way to every progressive shop production line as certainly as is tomorrow.

"Prior to organizing our maintenance crews for numerically controlled equipment, we sat back and tried to view the picture as a

(Standing) Foreman, plant engineering, plays tape recorder before group of plant engineering personnel detailing lectures which the foreman had attended at a recent convention.

"In selecting men for our maintenance crews, we went to the shop floor rather than the employment department . . ."

whole," a Convair Plant Engineering official pointed out. "We knew that because of the initial cost of these machines, the costs that would accrue from excessive downtime, and because of the critical nature of the work they would perform, that proper maintenance would be just as important as the acquisition of the machines themselves. We knew also that it would be some time before maintenance techniques could be standardized, and that all men engaged in maintenance work would be continually flooded with new information and data with which they would have to keep abreast. This indicated an important point to observe regarding the selection of men for our maintenance crews — they would not only have to have a good background in electrical and industrial electronics maintenance work, but their interest in the subject would have to be keen enough to inspire continual study and research for new information."

The first act at Convair in organizing their numerical control maintenance group was to select supervisory personnel with the necessary background qualifications and with a talent to absorb new knowledge and pass it on to others. This later talent was very important for it was decided from the start that only supervisory personnel would be accorded the advantages of attending all outside and extra-curricular training courses and programs that might be provided by various manufacturers of numerically controlled equipment, by universities, by trade schools, and so on. It would be up to these supervisors to absorb the knowledge provided by these sources and then return and pass on this knowledge to their men. This arrangement had a psychological as well as a technical advantage—it completely eliminated the disappointments that so often occur when certain men below the supervisory level are permitted to attend outside training courses while others must stay on the job.

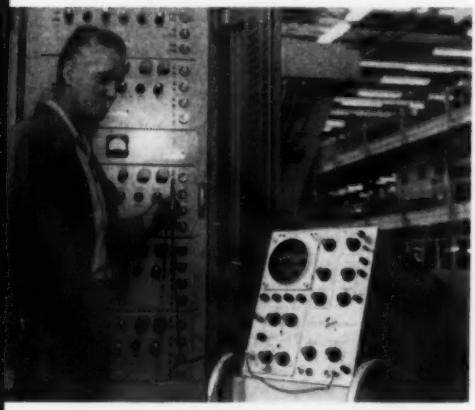
"In selecting the men for our maintenance crews, we managed to avoid a very common error which seems all too prevalent in connection with the personnel used for this purpose," one official said. "We *did not* underestimate the abilities of our own people. We went to the shop floor rather than the employment department for our crew, and the results have well-justified our act. Most of the men were selected from our electrical maintenance group and had some background in electricity and industrial electronics, but those selected had to evidence a keen and intense interest in the future of industrial electronics and the willingness to study and keep abreast of the new innovations and developments constantly flooding the industry.

"That selecting men on this basis was wise has already been proved. For instance, when an outside expert on numerical control visits the plant, the maintenance crews will gather around him dur-

ing every spare moment and listen in attentive silence while he lectures and gives chalk-talks on various phases of numerical control maintenance work. Another evidence of this keen interest occurs when a supervisor returns from an outside training course. He doesn't have to take the information he gathered to his crew—they come to him instead. It is a part of this supervisor's responsibility to be prepared for them. In addition to all printed information he could obtain from the training course, you may be sure he took a tape recorder with him and recorded every verbal lecture. These lectures are then played back for all to hear."

Another highlight of Convair's numerical control maintenance program is the close cooperation that exists between all plant departments that have anything to do whatsoever with the numerical control program. It has already been indicated that a great deal of democratic cooperation exists between the supervisor and his crew. This same degree of cooperation extends to the engineers designing parts for production by numerical control, the department in which the tapes are programmed for use, the Plant Engineering Design section, and the machine operators themselves. In a field as radically new as this one is, Convair officials point out, it is surprising how this type of close cooperation can solve problems which seem to have no obvious answer.

As might be supposed, with machines costing as much as most numerically controlled machines cost, keeping downtime to an absolute minimum is extremely important. Therefore, preventive maintenance plays a major role in all the activities accomplished by the maintenance crews. A major portion of this preventive maintenance has to do with periodic checking of the complex electronic circuitry which controls each machine. In this type of work, certain degree of standardization has been established.



Maintenance technician checks amplified output from reference channel on tape for numerically controlled profiler at Convair.

All major manufacturers of numerically controlled machines provide maintenance blueprints with the machine showing attachment points for checking the various electronic circuits. These circuits are checked with an oscilloscope which reproduces the wave form and amplitude of current in the circuit. At Convair, these maintenance blueprints were made even more useful by modifying them to include an exact diagram of the wave form and its amplitude as it should appear on the oscilloscope screen. Thus, the maintenance technician has only to check and compare the wave form

"As yet, most parts produced on numerically controlled machines are extremely costly and critical . . ."

being produced with that diagrammed on the print to note immediately if any discrepancy exists.

As a rule in this type of maintenance work, the preamplifiers are checked initially, first for their hum level and next for the amplitude they are producing. Then the wave shaper is checked for wave output to the power amplifiers. The power amplifiers come next with a check on the three phase signal, which excites the differential selsyn and feeds into the position measuring selsyn which forms the reference signal to the pulse discriminator. The phase differences being compared by the pulse discriminator between the reference channel and the motion channel are also carefully checked as it is these phase differences which control the direction the machine will move, how fast it will move, and how far.

When all wave forms, wave amplitudes, and phase differences in a system are as they should be, it is substantial evidence that the machine is operating as it should and will produce parts in conformance with the instructions programmed on the magnetic tape. But even a very slight deviation in these factors must not go unnoticed. As yet, most parts produced on numerically controlled machines are extremely costly and critical, and a deviation of even a few thousandths of an inch in final contour might be sufficient to consign them to scrap. Convair officials point out that allowable tolerances have no place in the circuitry used for numerical control. The control system must operate "on the nose," so to speak. Any "allowables" must be left for absorbtion by the mechanical portions of the tool.

Maintenance as it applies to an emergency repair when a machine breaks down unexpectedly is handled entirely differently. When such an emergency occurs, the machine operator pushes a button which lights a red signal light in the maintenance supervisor's office. This brings the supervisor immediately to the scene of the trouble. After consultation with the operator to determine the nature of the trouble, he surveys the situation and then calls in those technicians in his crew best qualified to cope with the trouble involved. According to Convair officials, this idea of having the supervisor literally "front and center" each time trouble occurs is working out very well. Specifically, the supervisor goes to the trouble — it is not relayed to him second-hand.

Convair were asked if they contemplated preparation of a maintenance manual on numerically controlled machines for use by the maintenance crews. The answer was an emphatic, "No! . . . Not yet. And perhaps not for some time to come."

Another official expanded on this subject. "A maintenance manual would serve only to regimentalize maintenance thinking. We do not desire this at this time. In the present state of the science dealing

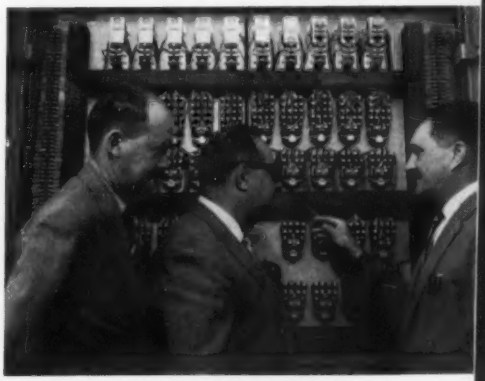
with numerical control, with new innovations and modifications of equipment occurring from time to time, even after the machine has been installed in the user's shop, such books, in addition to being very costly to produce, would be out-dated before they could be written and published.

"We have already mentioned that we modify the maintenance blueprints furnished by the machine manufacturers to include vital information such as wave forms, shapes, and amplitudes. These simple print modifications have proved extremely useful in speeding maintenance work and making certain that all portions of the circuitry are operating as they should."

A maintenance supervisor then broke in to point out that many of his men kept personal notebooks in which they noted information pertaining to their work. One such entry might describe a method for isolating a certain portion of the circuitry in order to give it a quick and thorough check. Another note might state that a certain circuit seemed to be operating under a continual overload. A third might point out that certain tubes were failing continuously, or that specific portions of the circuit seemed to be causing undue interference. "In several instances these 'notebook jottings' have proved so valuable that we have had them transcribed and circulated to all maintenance personnel," the supervisor said. "These notes will sometimes reveal information and peculiarities regarding the circuitry."

Another helpful hint on the speeding up of maintenance work was brought out. Many of the maintenance blueprints list tubes by numbers rather than by types. Thus, while the tube socket in which the tube is mounted will state that a 6L6 tube type should be used, the blueprint call-out may list this same tube as tube No. 301. At Convair, the tube number call-outs used on the blueprints have been transferred by grease pencil to a conspicuous place near where the tube is mounted in the equipment. This saves tedious circuitry tracing when the tube type and tube call-out numbers on the print differ. When the circuitry becomes more standardized, Convair officials plan to substitute stenciled numbers for the grease pencil numbers now used.

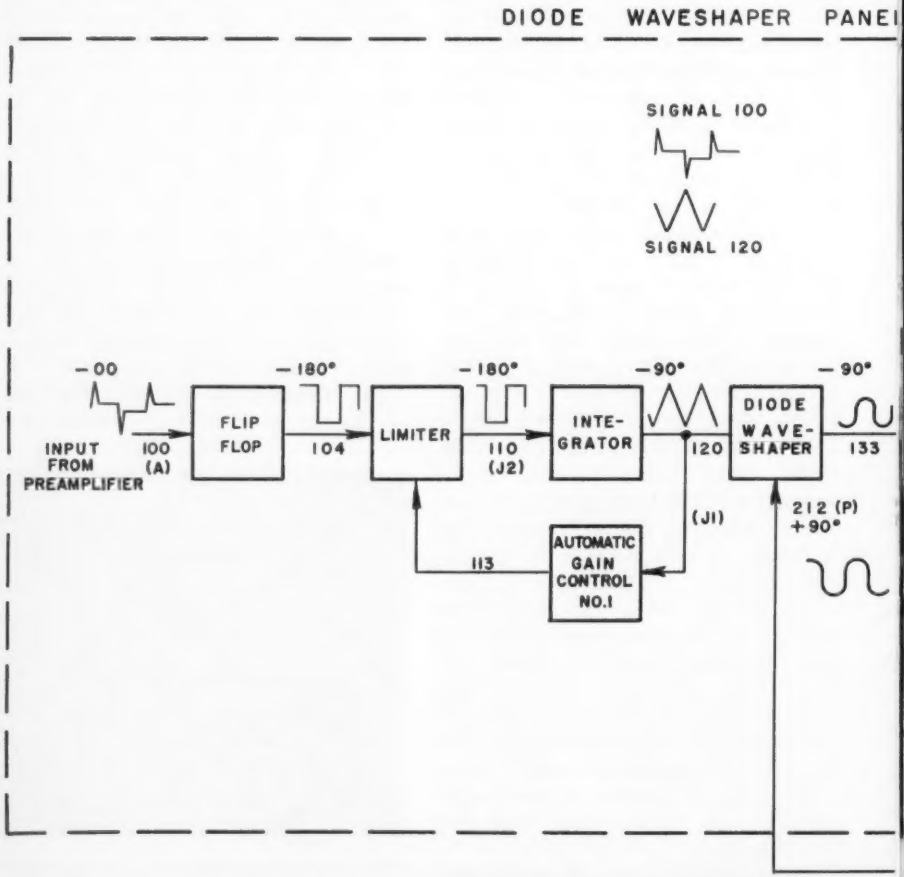
"In talking with the many visitors who visit our plant to inspect our numerically controlled machine installations, we have come to the conclusion that far too many people stand in awe of the complexity of these installations and are doubtful of the necessary talent in their own



Plant engineering executives and numerical control coordinator at Convair study circuitry of numerically controlled profiler.

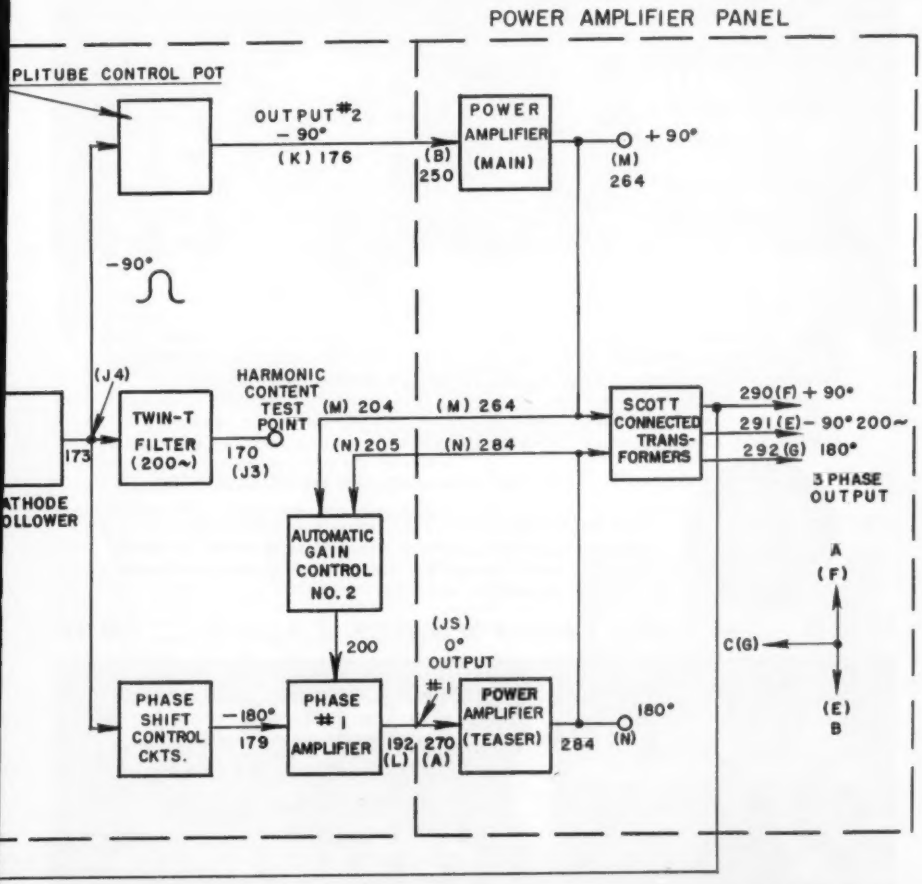
organizations to keep such machines running and avoid costly down time," one Convair official said. "We firmly believe that both his awe and doubt are but ungrounded fears. We have men on our own numerical control maintenance crews, chosen from our own maintenance department, who, a relatively short time ago, had never seen a numerically controlled machine in operation. These men are today accomplishing repair and adjustment jobs of extreme complexity. Our men are doing this type of work simply because we can get a quicker "fix" with less machine down time than would be required if an outside expert was called in."

In summing up their opinions regarding the organization of maintenance crews for numerically con-



This particular block diagram clearly shows a complete control circuit for a Giddings and Lewis

trolled machines, the Convair officials expressed a rather concrete philosophy. First, select a supervisor with the necessary background and the talent to become the "fountainhead" of information for all his men. Secondly, let this supervisor surround himself with men whose interest in industrial electronics is so keen that they are more than willing to absorb, or in fact eagerly seek all new information available. This interest may even supercede the man's immediate skill, but if it does, it will soon beget the skill necessary to accomplish the work. Finally, don't underestimate the abilities and the talents of the men in your own organization. Build up their morale by looking to them, rather than to outsiders, for the particular assistance you require.



profile type milling machine to which appropriate wave forms have been added, as indicated.

APEX -authority on fastening

Routine equipment maintenance in a midwestern factory requires frequent removal and replacement of castellated nuts of various sizes. Standard sockets can't be used for this work, as each nut fits snugly into a deep, narrow recess.

This job used to be done, after a fashion, with a hammer and chisel. Now, Apex special sockets, specifically designed and built for this application, are used. The Apex method is faster, safer and cheaper . . . and it eliminates costly damage to tools and fasteners.

Almost everyone knows that, at Apex, "we quote promptly on specials" . . . and we produce and deliver just as promptly. On your special fastening problem, why not ask Apex for the answer?

FOR STANDARD NUT RUNNING APPLICATIONS

Apex has the specials . . . plus more than 5,000 stock sizes and types of nut running tools as well. Wherever there's a nut running job, Apex Catalog 29-R is needed. Write, on your company letterhead please, for your copy.

1933 *A Quarter Century of Service to Industry* 1958

THE APEX MACHINE & TOOL CO.
1027 S. Patterson Blvd.
DAYTON 1, OHIO

TOOLS FOR screwdriving nut running FASTENING

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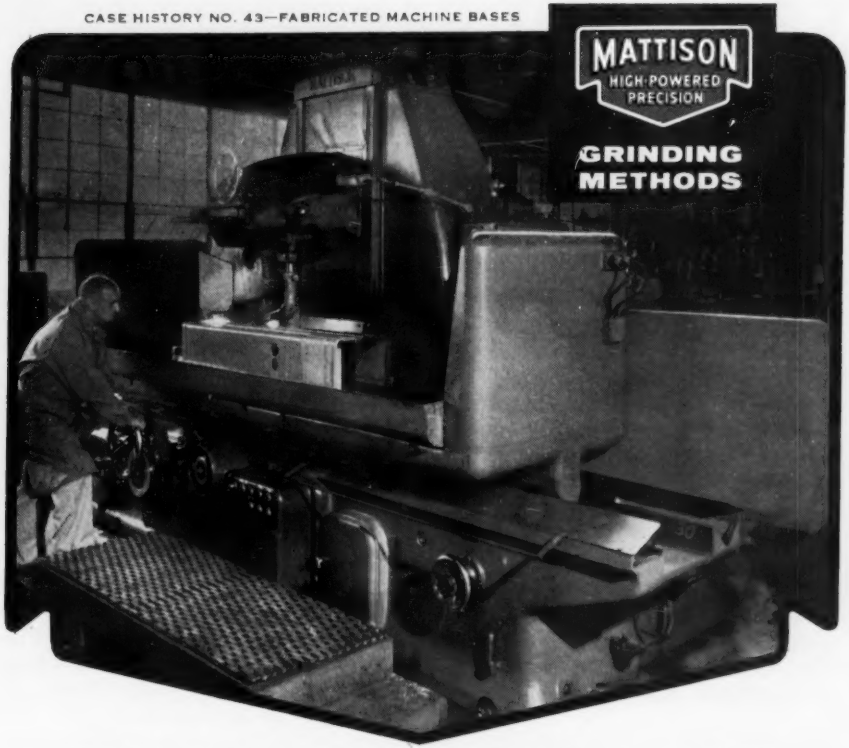
CASE HISTORY NO. 43—FABRICATED MACHINE BASES

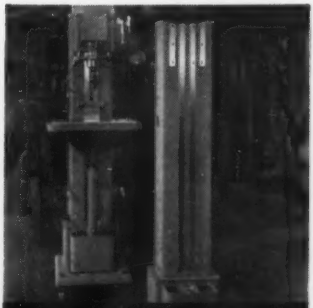


Machine bases made faster, better... with switch to steel fabrication and surface grinding!

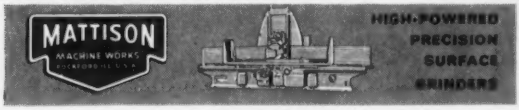
"Our Mattison surface grinder accelerates production by 100%, improves accuracy, reduces wheel dressing 700%, facilitates assembly, maintains better finish, increases wheel width, eliminates chatter, and helps retain product quality without price increases," says Mr. Herman Goldberg, president of the Snow Manufacturing Company.

The grinder was part of a program which involved switching from cast iron to fabricated steel bases and replacement of milling with grinding. Now, this company is converted to steel fabrication in 98% of its operations.

Vitally important to precision of their machines is accurate grinding of the 59-inch-long channels on the vertical main frames. All surfaces are ground to limits of plus or minus .005 in., and flatness is held to .0015 in. Parallelism of dovetail assemblies is held to .0005 in.



Flatness of 59-inch-long channels is held to .0015-inch over entire length.



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COMAPRO Spearheads Effort to Achieve More Production

Research into the production of workpieces on multiple spindle bar automatics points way to greater savings.

Out of one of the important cradles of industrial activity in this country has come a newly coined word — COMAPRO, which is destined to create considerable interest whenever metal manufacturing operations are performed. The word is derived from COoperative MAchining PROject, an activity of Cone Automatic Machine Company, Inc., involving some 17 producers of machines, tools, and equipment.

Fig. 1—The first component to be produced in this study is a spark plug shell.

In brief, COMAPRO is a thorough-going attempt, in considerable depth, to determine the best possible reproducible operating conditions for the multiple spindle bar automatic. The following article covers the background of the program, a look into the work already accomplished, and a glimpse at the project as it is now operating. The ultimate goal is improved machining conditions and a more standardized method of cost finding.

The conditions that affect any multiple spindle bar automatic performance are the qualities, responsibilities, and coordination of six basic factors. These are: the bar stock; the tools and toolholders; the measurement control; the coolant and lubrication; the machine; and the personnel on all levels that enter into the supply and use of these factors.

At the outset, it was assumed that suppliers and users of quality products and services, associated with these factors, could benefit from improved machining practices, and from more detailed, demonstrated, knowledge of their attainment. Af-

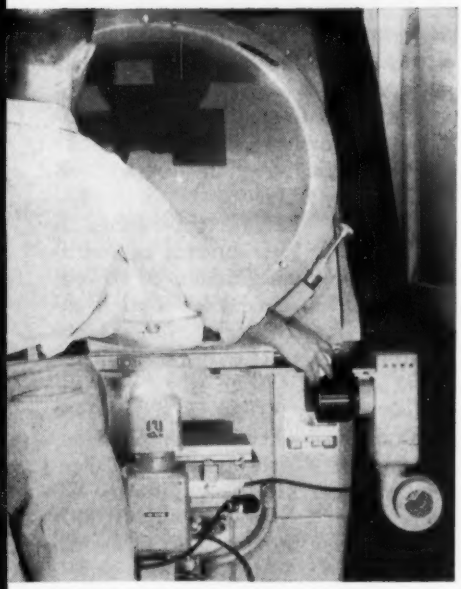


Fig. 2—A 30 inch Jones & Lamson floor type comparator is used for inspection.

ter checking with a few multiple bar automatic users, the cooperative, educational type of practical cost research was visualized and proposed to supplier manufacturers.

The response was gratifying, and, because the number of participants had to be limited, there was a problem of choice in several instances. But, where this occurred, and other considerations were equal, it was logical and fair to respect the promptness of the respondents and the degree of enthusiasm expressed. Compatibility was important, particularly where companies with a variety of products competed with the products of other companies. Because of the educational nature of the project, it was important that each participant appreciate the more far-reaching service results to be had from emphasis on the type of his product instead of the brand.

The proposal to prospective sponsors suggested that work components of large volume, popular grades of steel, and commonly used tool combinations, be selected across industry, and be analysed to prescribe the most optimum conditions for the lowest cost per piece. Following this, the work components would be test run to substantiate the prescribed conditions. Finally, a simulated production run would be made of each, under optimum conditions, to determine the actual cost per piece.

A procedure of this kind would demonstrate to the machine user the cost savings that could result from the use of quality products and practices. It could help the "automatic" user make a comparison of his own operations, where similar work is involved or anticipated.

Each participating company was

Fig. 3—A group of adjustable mechanical gages was supplied by Federal Products.

Fig. 4—Wilson Mechanical Instrument Co. supplied this Rockwell hardness tester.

responsible for the quality of the product or service that it sponsored, and the specifications and instructions for each product were rigidly adhered to by the other sponsors.

The foregoing presentation was accepted, and the initial work components were selected. After clearing many details, and after the receipt of the various sponsored products and equipment, actual work was begun on the first component —a spark plug shell illustrated in Fig. 1.

For the project, the Cone Automatic Machine Company sponsored an enclosed area in a corner of one wing of its plant, and a modern 1⅝ inch, Model TF, 6-spindle bar Conomatic, with operating personnel. The area is known as the Comapro Department.

It was early recognized that the equipment that would maintain the efficient use of the bar stock, tools, coolant, lubrication, and machine, would be directly or indirectly as important as those factors themselves, in the attainment of optimum conditions. This equipment is more specifically identified and illustrated as follows:

(Fig. 2)—A 30 inch Jones & Lamson floor type, optical comparator and measuring machine, arranged for 10 magnifications and higher; with high intensity, fan cooled, illuminating unit; with angle measuring assembly; with worm for fine setting; with 30 inch diameter ground glass screen; with right angle and 60 degree lines; with electronic power elevating unit to elevate table 4 inches (with 0.0001 inch graduations); with 18 inch table having 5 inch lateral travel; with 12 inch micrometer graduated 0.0001 of an inch; with oblique reflection attachment and normal light

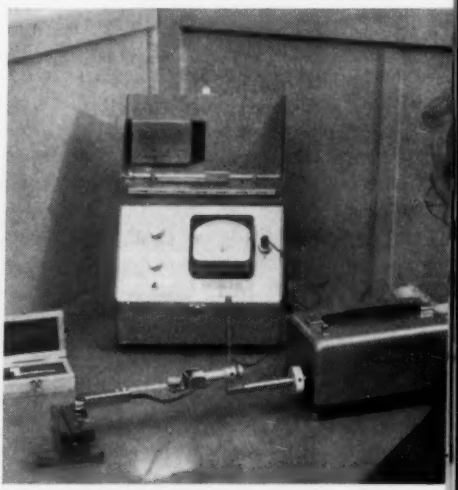


Fig. 5—This Brush Electronics Co. Surfindicator checks the surface finishes.

reflection attachment; with spindle assembly, 10 power lens bracket assembly, and condensing lens assembly; with 2 inch V-block stage, and a special 30¾ inch diameter frosted glass chart, for inspecting the spark plug shell component, and for checking the profiles of tools for the same at 10 magnifications.

(Fig. 3)—A group of adjustable, mechanical, gages by Federal Products Corporation, of basic catalog design, covering the 9 dimensional sizes of the spark plug shell, with tolerance limit markings to permit knowledge of trend of machining size control; a back ground table for supporting the gages, and for ready identification of each with the respective dimension that it inspects, as shown by a framed drawing of the shell, at viewing level, above the gages.

(Fig. 4)—A Wilson Mechanical Instrument Rockwell hardness tester, with B scale for determining the surface hardness of bar stock and tubing, and with C scale for inspecting the hardness of tools.

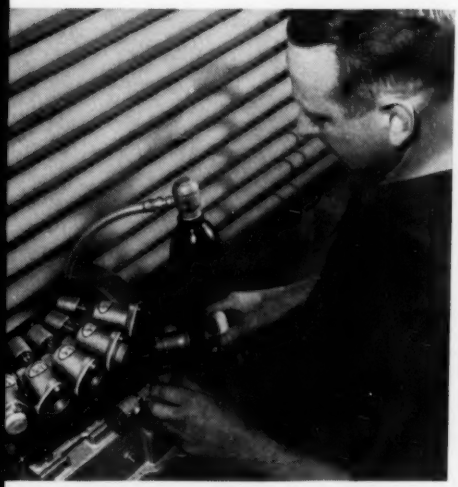


Fig. 6—Shown is the Black Diamond Saw & Machine Works precision drill grinder.

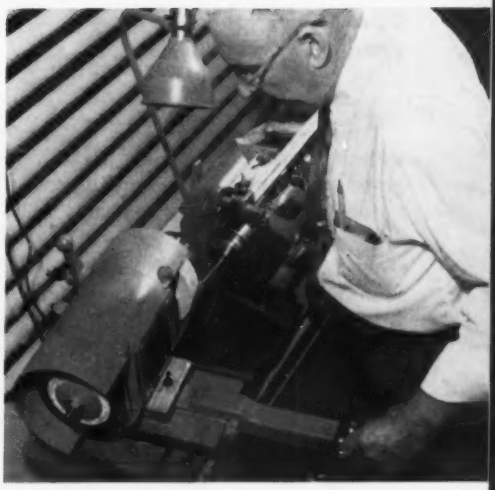


Fig. 7—The Edward Blake Company supplied this No. 2 tap chamfer grinder.

(Fig. 5)—A Brush Electronics Co. Surfindicator, for inspecting the surface finish of various work and tools.

(Fig. 6)—A Model 3B Black Diamond Saw & Machine Works precision drill grinder, with web thinning attachment, and with an assortment of collets, for handling a range of straight, or taper, shank drills of ⅛ to ¾ inch diameters.

(Fig. 7) — An Edward Blake Company No. 2 tap chamfer grinder, with accessories, for sharpening the leads on right hand and left hand taps, reamers, countersinks, and drills.

(Fig. 8) — An Edward Blake Company flute grinder, with built-in coolant system, diamond wheel

dressing device and collets, for the equal spacing of flutes and the maintenance of desired hook and rake angles.

(Fig. 9)—A Lincoln Engineering Company electrically timed central lubrication system installation, on the Conomatic, for saving time and labor required by conventional means of greasing, and to assure proper maintenance of the machine's slower moving functional parts.

(Fig. 10)—A Royal Oak Tool & Machine Co. universal form relieving tool grinder, for grinding tool diameters and angular and radial reliefs.

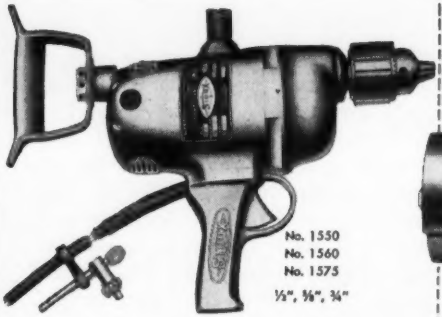
(Not Shown)—A No. 3B, horizontal spindle, surface grinder, not yet installed from Abrasive Machine Tool Co., for tool and department maintenance.

It is hoped to impressively present the importance of the cutting tool in its proper emphasis and relation to the entire effort. Any acceptable tool material always establishes the conditions that must be met for its most effective use. The qualities of all other factors of the project contribute to the effectiveness of the tools.

One of the first considerations of the tools is the quality of the material to be machined. The contributions of good grades of bar stock to optimum tooling and machining conditions cannot be over estimated. Any saving from the use of inferior quality stock is reminiscent of the story of the Scot who severed his windpipe to cut down on his grocery bill. The bar steel used by Comapro is sponsored by Jones & Laughlin Steel Corporation and Joseph T. Ryerson & Son Incorporated. The spark plug shell, now being developed, is made of J&L type A, leaded, 13/16 inch hexagonal, 12 foot bars. The second component to be run by the project is a bushing, made of leaded 8630 steel, sponsored by Joseph T. Ryerson & Son Incorporated.

Because of the prevalent use of high speed steel tools on multiple bar automatics, particularly for the higher volume, less complicated, type of work contemplated by Comapro, the initial machining will be done with high speed steel tools. However, the objective being low-cost production, it is logical to use cast steel tools or carbide, whenever they are indicated, or, a combination of both with high speed steel.

Fig. 8—Illustrated is the Edward Blake Company flute grinder with coolant system.



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No. 1575
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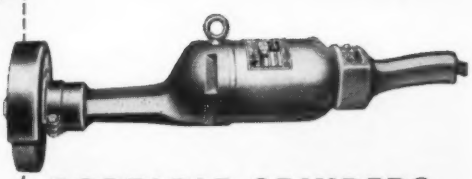
Rugged Construction
A Size for Every Need
Sioux Dependability
No Drill is Built to Last Longer



PORTABLE GRINDERS

A Dependable, Heavy Duty Tool for Grinding, Buffing, Wire Brushing.
5" and 6" Wheel Diameters.
Carefully Balanced for Easy Handling.
Sioux Quality Throughout

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TOOLS
STANDARD THE WORLD OVER
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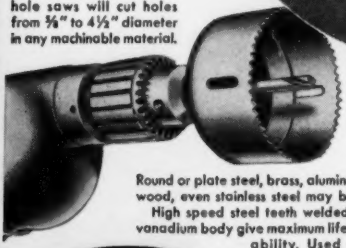
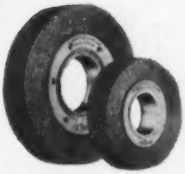
HIGH SPEED HOLE SAWS

Sioux high speed teeth hole saws will cut holes from ⅜" to 4½" diameter in any machinable material.



Round or plate steel, brass, aluminum, bronze, wood, even stainless steel may be cut.
High speed steel teeth welded to chrome vanadium body give maximum life and cutting ability. Used in electric drills, drill press, or lathe.

WIRE WHEEL BRUSHES



Durably built of special brushing wire with wide face, even trim, perfect balance. Designed for heavy duty cleaning, removing, deburring, descaling, roughing, buffing, and polishing.

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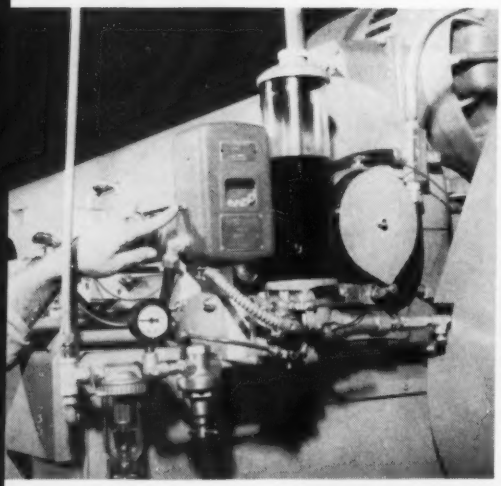


Fig. 9—The Lincoln Engineering Company supplied a central lubrication system.

As illustrated in Fig. 11, Firth Sterling Inc. is sponsoring the high speed steel, cast steel, and carbide materials, for the form tools, cut-off and facing blades, tool bits, and shaving, recessing, and trepanning tools. The form tools and cut-off blades for the spark plug shell job are made of Circle C brand, and the shaving tools are made of Van Chip. John Bath Co., Inc. is the sponsor of the ground thread taps. The Cleveland Twist Drill Company is the sponsor of the Cle-forge drills, and the counterbores and reamers. Jones & Lamson Machine Company Thread Tool Division is sponsor of the self-opening die heads and hollow mills.

An outstanding contributor to the effectiveness of the cutting tool, is the Toolitrol method of tool control, shown in Fig. 12, sponsored by Scully-Jones & Company. It is a pre-set, quick-change device which removes the responsibility of tool maintenance from the operator and places it with the tool supervisor, or processing engineer. A control board is wired to the "automatic," and has several functions. It is an exchange station for dull cutting tools received from the operator in exchange for properly conditioned replacements.

It is a center, at which the supervisor presets, with Scully-Jones supplied gages, the sharpened tools for projection, or for overall length. Counter switches, behind locked panels of the board, are geared and set to a predetermined number of workpieces that the critical tools in the machine will work on, before the machine is automatically shut

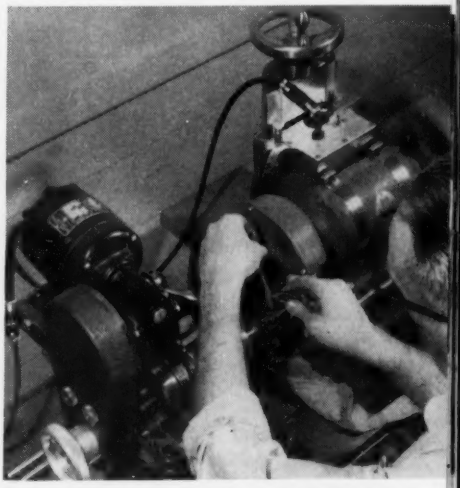
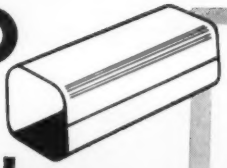
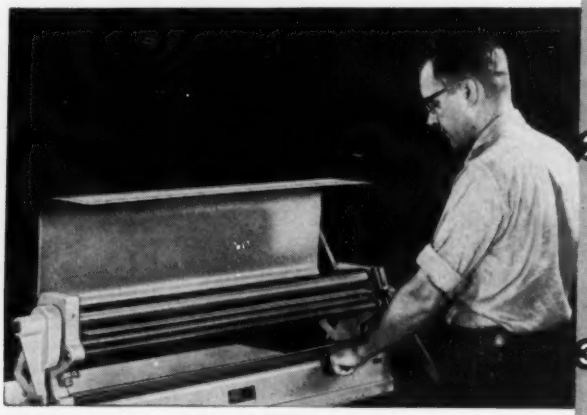


Fig. 10—A Royal Oak Tool & Machine Co. form relieving tool grinder is used.

HOW TO form a rectangular shape





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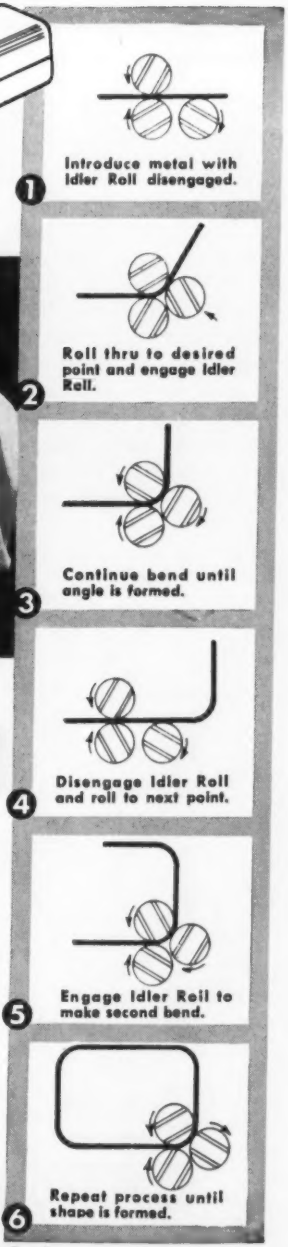
Forming small and large circles without flat spots and a variety of other sheet metal shapes is easily accomplished on the Di-Acro Roller with its *exclusive cam actuated Idler Roll.* Consult the yellow pages of your phone book for the name of your nearest Di-Acro distributor or write for six page instruction folder.


1
Introduce metal with Idler Roll disengaged.
2
Roll thru to desired point and engage Idler Roll.
3
Continue bend until angle is formed.
4
Disengage Idler Roll and roll to next point.
5
Engage Idler Roll to make second bend.
6
Repeat process until shape is formed.

pronounced die-ack-ro

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down. A red light, above the board, flashes continually while the machine is down.

The operator cannot re-start the machine until the supervisor unlocks the board panels and resets the individual counter switches. The functions of the control board are part of a controlled tool flow, suggested by a Scully-Jones chart. In brief, the chart routes dull tools from the "automatic," to the "Toolitrol" board, through inspection, through the grinders, through inspection again, and back to the "Toolitrol" board, where they await the predetermined needs of the machine. The preset, quick-change type of toolholders used permit removal, without wrenches, of dull tools, and replacements of sharp tools by the operator in a fraction of the time permitted by the conventional type holders, and without scrap work accumulation from resetting and obtaining sizes. The time for removing nine perishable tools on the spark plug shell job, and replacing them with sharp tools, totals 5 minutes and 40 seconds. The time for removal and replacement of the same tools, held in conventional holders, is 42 minutes and 35 seconds. As the cycle time for machining the spark plug shell, under presently prescribed conditions, is 4.41 seconds per piece, this new tooling method saves 37 minutes of machine down time at every nine tool replacement, and in the 37 minutes the machine produces 503 workpieces. It may easily be understood that maximum return from this method is in proportion to the quality of the overall tool maintenance conditions in a given plant, and the quality of the other machining factors.

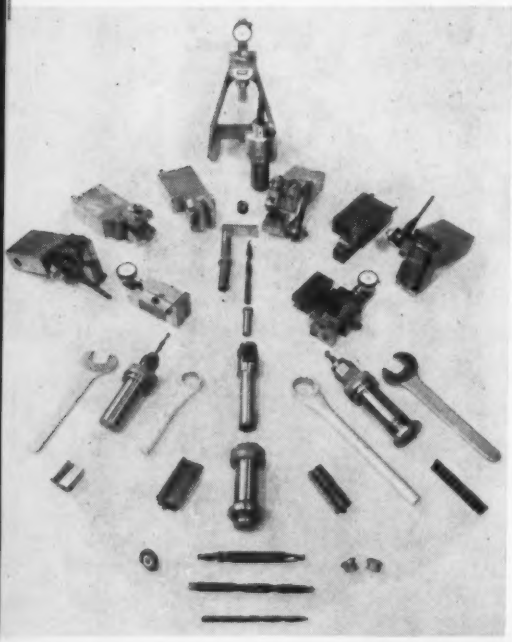

Fig. 11—Firth Sterling is sponsoring the high speed and cast steel used.

As reducers and controllers of heat and friction, coolants are the lifesavers of tools and machine. Without their aid, present machining standards of multiple bar automatics could not be maintained, and close work limits and quality finish would not be possible. The fast dissipation of heat and fire resistant features of the water soluble type of coolant have made its use popular on any "automatic" that is

eliminate "cut and try" with Microbore...

... THE TOOL THAT ADJUSTS PRECISELY IN SECONDS!

YES, EVERY TIME—ALL THE TIME! In seconds, with our proven micrometer vernier adjustment, any operator who can read a "mike" can adjust a Microbore Tool for precision boring to extremely close tolerances.

Any production man knows what that means. Elimination of wasteful down time. Greater productivity of men and machines. Fewer rejects. Better parts due to holding closer tolerances.

It just makes good sense to *Modernize with Microbore*. A few dollars so invested can increase the productivity of a machine costing thousands.

Microbore units can also be applied in clusters for special tooling designed for high production applications.

A wide range of Microbore Boring Bars with NMTB taper, Morse taper, Flash-Change and Straight Shanks are available singly or in complete sets. Standard set includes Microbore units for each tool station, grinding blocks and necessary wrenches, in a fitted hardwood case.

• As the first step in eliminating your own costly "cut and try" methods, write for Microbore Catalog No. 56.

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"The machine's function is to consistently bring two materials together . . ."

well sealed against the mixing of coolant with the lubrication oil. Gulf Oil Corporation as illustrated in Fig. 13 is the sponsor of greases, lubricating oils, and various types of coolants for the Comapro Model TF Conomatic. The coolant for the spark plug job is Gulfcut, heavy duty, soluble oil, with a blend of 1 part oil to 20 parts of water. The lubricating oil for the circulation system is Gulf Seneca 54. The main end slide bath lubrication is Gulf Senate 110. The liquid grease for the Lincoln automatic system is also sponsored by Gulf.

Full benefit from optimum surface speeds and tool feeds can only be attained through as high an average of team performance of the six factors as can reasonably be maintained. Machinability tables and computers are very helpful in taking the first steps toward the attainment of optimum speeds and feeds. The tables are usually based on average machining conditions. It is the bettering of this average that counts in lowering the unit cost per work piece.

The machine's function is to consistently bring two materials together with the purpose of removing material from one and preserving the material of the other. The requirement of dependable performance of the "automatic" is so important that speeds and feeds have often been reduced to inefficient cutting conditions in order to make the tools endure throughout a four, or eight, hour shift, in preference to suffering the cost of down time for tool replacement. It is hoped to effectively demonstrate the value of the Scully-Jones "Toolitrol" in remedying this unsatisfactory and costly machining condition.

The 1⅝ inch size Conomatic shown in Fig. 14 was chosen for the work of Comapro, because the largest volumes of work for the multiple bar automatic is of 1⅝ inch round bar diameter and less. Model TF was chosen because of its many

Fig. 12 — The Toolitrol sponsored by Scully-Jones & Co. is illustrated.

"SAY THAT AGAIN.. ..I DARE YOU!"

■ Okay . . . we'll say it again! There's a simple solution to *Grinding Wheel Problems*—Just switch to CINCINNATI (PD)° WHEELS! CINCINNATI Grinding Wheels offer *positive duplication*—precision manufacturing and quality control that can save you money and increase your production.

Pounce on these facts: The CINCINNATI (PD) Manufacturing process assures Positive Duplication of the original wheel every time you re-order. "On Grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS act and grind exactly alike! *Yet* CINCINNATI (PD) WHEELS are priced *no higher than ordinary wheels!*

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So "Hold That Tiger". . . and hold down those costs! See your CINCINNATI Grinding Wheels Distributor. He'll be glad to explain how (PD) WHEELS can save you money and increase production. Or write, wire or telephone Sales Manager, CINCINNATI Milling Products Division, Cincinnati 9, Ohio.

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"The teamwork of responsible personnel is always essential to the best machining conditions in any plant."

Fig. 13 — The Gulf Oil Corporation is sponsor of greases, oils and coolants.

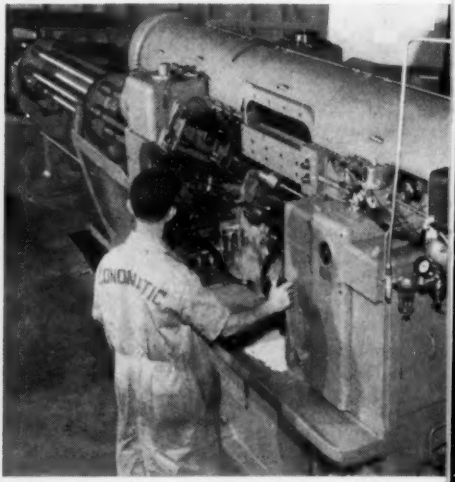


Fig. 14—This 1⅝ inch size Conamatic was chosen as typical of machines used.

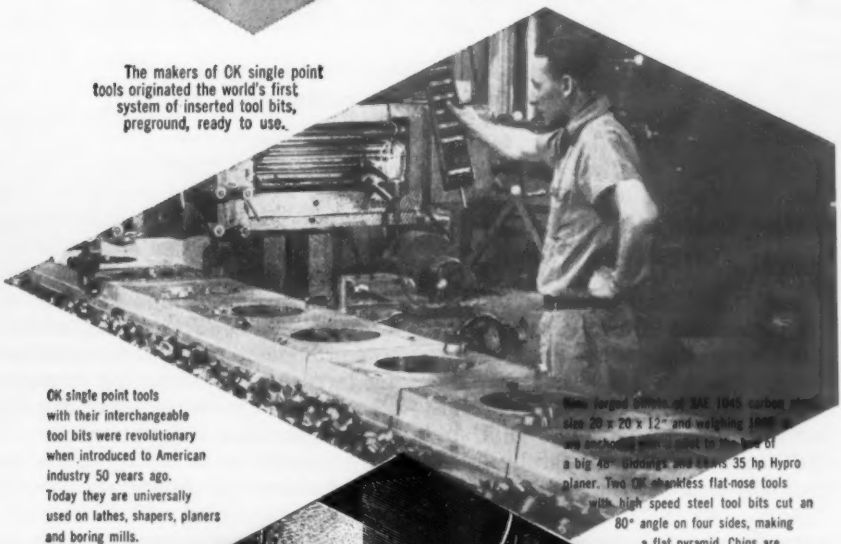
fast job changeover features. Among these are master cams, with adjustable working strokes for all tool slides and for bar stock feedout. It has inserted pad collets and solid type pushers. It is powered by a 40 h.p. motor, to make unnecessary any motor change for any type of work within the collet capacity of the machine. It is equipped with a horsepower meter. Sound deadened stock tubes are standard equipment. Its work spindle speeds range from 128 r.p.m. to 2,502 r.p.m. with 43 speed changes. It has a broad range of feeds, with 34 changes. The machine is specially equipped with a power feed knock-off that is designed to automatically disengage the feed clutch at the "low point" of the cycle, when the "Toolitrol" board counter switches provide the proper signal.

During extended periods of emphasis on deliveries and more and faster production, quality standards are usually on the defensive. Compromises with quality standards can have a bad effect on plant personnel at all levels. The ill results of the precedents established by them sometimes take years to overcome. The teamwork of responsible personnel is always essential to the best machining conditions in any plant, and the teamwork between the product and service supplier and user is no less important to encouragement and attainment of quality standards in any field of metalcutting.

How Bullard with two **OK** Man-au-trol turret heads are gang-planed

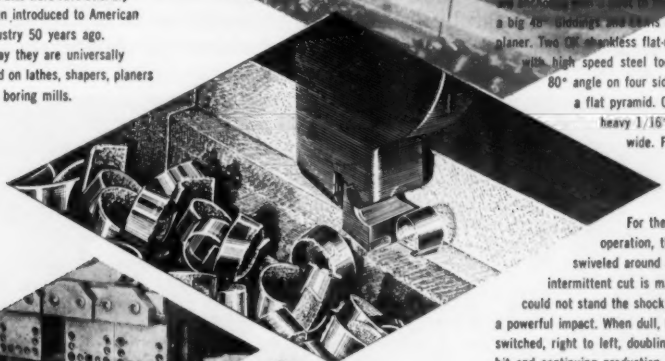
single point tools

The makers of OK single point tools originated the world's first system of inserted tool bits, preground, ready to use.



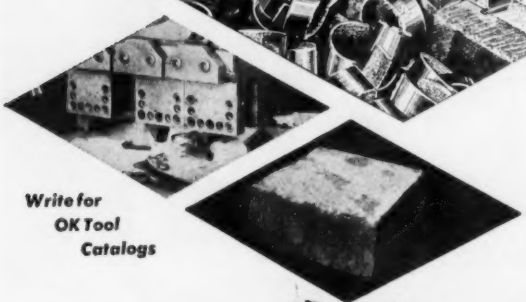
OK single point tools with their interchangeable tool bits were revolutionary when introduced to American industry 50 years ago. Today they are universally used on lathes, shapers, planers and boring mills.

New forged billets of SAE 1045 carbon steel, size 20 x 20 x 12" and weighing 1000 lb, are anchored with a pilot to the bed of a big 48" Giddings and Lewis 35 hp Hypro planer. Two OK shankless flat-nose tools with high speed steel tool bits cut an 80° angle on four sides, making a flat pyramid. Chips are heavy 1/16" depth, 3/4" wide. Feed, 40 ft/m.



For the second operation, the blocks are swiveled around and a rugged intermittent cut is made. Carbide could not stand the shock of such a powerful impact. When dull, tool bits are switched, right to left, doubling to life of the bit and continuing production with the minimum of downtime.

OK tools are built for heavy machining. Holders are tough forgings. For tool bits, you have a choice of high speed steel, cobalt, Vasco Supreme and carbide.



Write for OK Tool Catalogs

TWO COMPONENTS— BODY AND BLADES

OK **modern milling cutters for modern milling machines**

THE OK TOOL CO., INC., Milford, New Hampshire

For more data circle 369 on Postpaid Card

more production through modernization

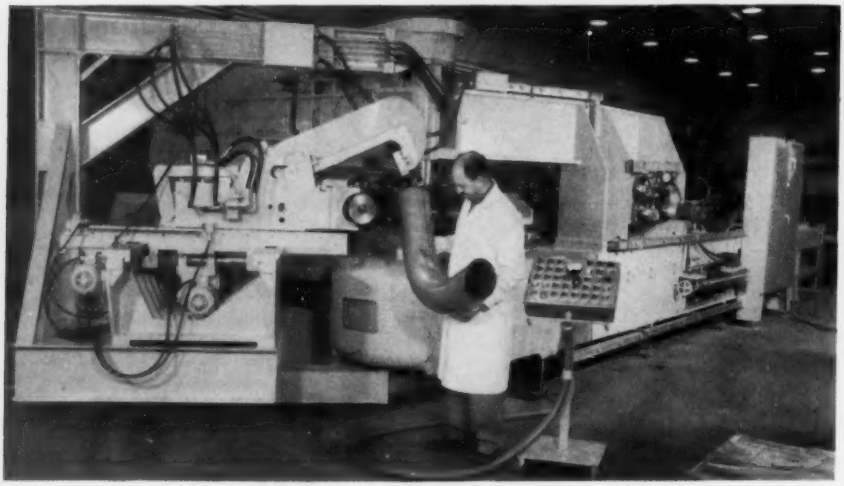
Techniques for increasing output with newly developed machines and tools.

Edited by LOUIS H. DOERMAN

Giant Bending Machine Bends Ultra-Thin Tubing for Aircraft

The largest tube bending machine ever built—a giant, hydraulically-operated unit that for the first time makes possible the bending of ultra-thin 8 inch O.D. by 0.020 inch stainless-steel tubing has been built by Pines Engineering Co., Incorporated. Currently, large tube bends of this size are made by the half-shell stamping method, the two shells being welded together to form an elbow. The new machine now provides the means for producing large bent sections for stronger tube components widely used for air and fuel ducting in jet aircraft.

The machine incorporates many new features including a direct-



The above illustration shows the largest thin-wall aircraft tubing bender ever built for forming 8 inch diameter by 0.020 inch stainless steel tubes on a 16 inch C. L. R.

acting hydraulic pressure die, a direct-acting C-frame clamping die, and an independent retractable swinging arm which permits removal of the formed tube from the dies at the end of the bending stroke. These, along with fully mechanized tooling adjustment, are incorporated into the new bender to simplify operations, speed set-ups, and for more accurate control of the bending operation. Rigid frame construction and new concepts of pressure control help eliminate tooling deflection and assure smooth, wrinkle-free bends without rupturing the thin-wall material.

One of the more interesting refinements of the machine is a separate set-up control panel which permits accurate dial pressure settings for clamp die, pressure die, and the tube booster operations. This assures faster, more accurate setups than ever before possible and effects substantial savings in the small-lot bending of expensive materials. Precise pressure settings are made possible by utilizing a direct-acting tube booster attachment. The booster applies pressure to the end of the workpiece during the bending cycle. Each pressure setting for the different tooling components is set independently, is easily varied to obtain desired results, and may be charted to insure duplicating results on re-run jobs.

To further reduce set-up time, all tool carriages of the machine are fully motorized and adjustments are controlled by pushbuttons located in the main operating control stand. Provision for controlling the speed of the main bending cylinder from the operating panel is also included.

The motorized control of machine adjustments includes both longitudinal and lateral movement of the pressure die, the clamp die, and the mandrel carriages. This serves to provide the means for making settings to suit either an increase or decrease in radius requirements of the bend and workpiece. The lateral movement of the clamp die carriage permits adjusting to suit tangent lengths. In addition, there is also a motorized pushbutton control unit provided to handle mandrel stroke adjustments.

The bending speed control of the machine features an electro-servo mechanism remotely controlled by the operator which incorporates a pre-selected speed variation cam for repetitive cycling. Variations of the bending speed within the specified range of the cam are obtainable at the operator's option and changes can be made smoothly and without

View of tooling showing direct-acting C-frame clamping die raised and being returned.

surge during rotation. Different replaceable cams can be provided to suit special range variations.

The special C-frame clamp die design eliminates applying clamping pressure against the main spindle of the bending form. The C-frame clamp lowers into position and locks on the straight section of the bending form to equalize the thrust of the clamping pressure and serves to reduce deflection. The independent mounting of the swinging arm permits the arm to move forward freely during the bending stroke and, at the end of the stroke, allows the operator to unclamp the work and return the swinging arm independently of the bending form. The independent return cycle is powered by an overhead sprocket and chain mounted horizontally above the swinging arm spindle and frame. The frame, swinging arm, heavy cast steel nose and spindle bearings are of extra rugged construction to minimize tool deflection and assure more accurate control of bending results.

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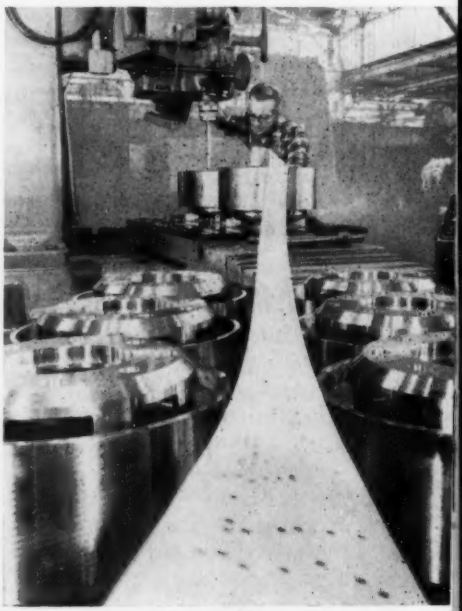
Tape Controlled Jig Borer Saves Time and Increases Accuracy

Holes punched in tape automatically control the operation of this Pratt and Whitney numerically controlled jig borer as it performs a multiple hole drilling and boring operation on planetary gear cages made for the Bureau of Ships, U. S. Navy.

The machine, whose control prevents human error and is accurate to the 30th part of the paper on which this is written, has been installed at the Snow-Nabstedt Gear Corporation, manufacturer of marine reduction gears for the Navy. While eliminating error, it has halved the time required for the intricate operations.

The gear housings are made from Ampcoloy 46, a special metal alloy, and weigh 150 pounds each. More than 15 pounds of material are removed in the drilling and boring operations. The holes, which are more than nine inches deep, must



This jig borer is automatically controlled by holes punched in tape and is accurate within one ten-thousandth of an inch.

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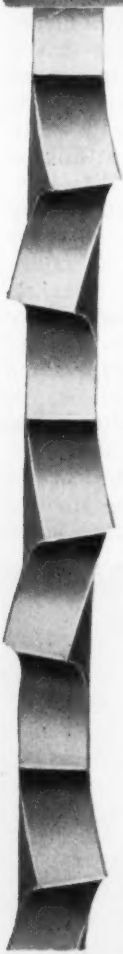

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be accurately spotted within one ten-thousandth of an inch in relation to each other and the entire cage.

The task is performed automatically without human intervention through the use of the tape controlled device.

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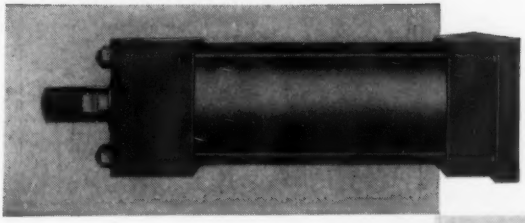
Infrared Saves Time, Money and Floorspace

Multiple savings, even with a nominal labor cost, have accrued to the State of Connecticut in the production of license plates at the State Reformatory. Replacing dipping degreasing methods with a radiant oven installation has resulted in a net money savings, due to the lower cost of electricity than of chemicals formerly used. Previous methods degreased about 300 plates per hour as opposed to the current rate of over 1,200 plates per hour. In addition the same unit can be used for the paint baking process.

Engineered by the Fostoria Pressed Steel Corp., the installation consists of an overhead power driven monorail conveyor which moves the plates through a Fostoria quartz lamp with radiant oven with built-in ventilation. Operating at full capacity the unit is designed to thermally degrease 5,000 plates in three hours and bake, through the prime coat, 2,000 plates every six hours.

Fully automatic, the oven requires no heat-up or cool-down period and can be made to produce varying operating temperatures and baking cycles on demand. A 700 degree F., 2 minute cycle is used for the degreasing operation. Top coat baking is accomplished at 300 degree F. in two minutes. Heating can be held to an 8 minute 250 de-

Combination radiant oven being used at Connecticut Reformatory has three temperature ranges to accommodate degreasing, prime-coat and top coat paint baking operations.



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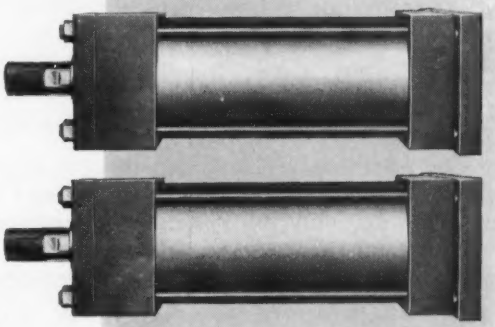
2 competitors' cylinders
▼

do they LOOK ALIKE? ...sure they do on the surface...



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Logansquare Cylinders
are made to interchange with other leading manufacturers' cylinders . . .

1. Logan designs assure the service required for those extra-rugged applications.
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3. Built by CRAFTSMEN whose average service record with LOGAN is more than 20 years.
4. Manufactured in a plant which applies the most modern production methods.

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gree range whenever recommended. Estimated power cost is $62 per week for degreasing and $20 for paint baking. The entire finishing system is very compact, fitting into a floor space 35 feet by 10 feet and will accommodate highway signs up to 24 inches high.

The quartz lamps, similar to the radiant heating lamps widely used in industrial heating processes, have a high resistance to thermal shock, thereby affording protection to the operators. The system can be so arranged so that only the loading and unloading stations are accessible which provides a greater measure of safety.

The new system requires less "housekeeping" and occupies less space than the older system thereby permitting an increased production rate.

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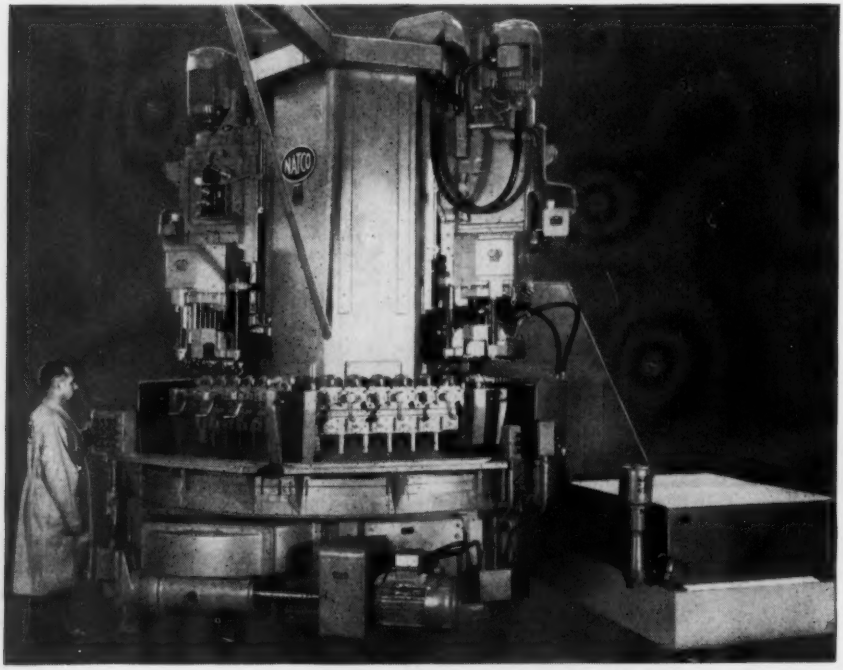
Setup Produces More Connecting Rods per Hour

Approximately 435 forged steel automotive connecting rods per hour are produced on



These two center column machines automatically drill, core drill, chamfer, and ream piston pins at the rate of 435 pins per hour. The pins are made of forged steel.

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Says

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A well-known government gage laboratory recently reported on their study of our Hilo Thread Setting Plug Gages as follows:

"The setting plugs were used to retest several of the thread rings we had in stock. The results were enlightening. Some were rejectable because of worn flank; others were rejectable or borderline because of bell mouth.

"The HILO Setting Plug is unquestionably sound and superior . . . a saving of many man hours by less skilled help for acceptance inspection and surveillance can be foreseen."

A word to the wise is sufficient. You, too, can employ no more positive method for setting your thread ring gages and other adjustable instruments for the inspection of male threaded parts than with Pipe Machinery Hilo Set Plugs.

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two center column machines built by National Automatic Tool Company, Inc. The 100 inch diameter, six-position center column machines work in series and are arranged to hold six parts in each position.

In the first machine the piston holes are drilled, core-drilled, chamfered from both ends and reamed to a final diameter of 1.0475 inches. Processed parts are unloaded and unprocessed parts are loaded in position No. 1. In position No. 2 the piston holes are drilled halfway through and in position No. 3, they are drilled the rest of the way through. In position No. 4, the same holes are core-drilled for reaming. In position No. 5, using a special tool for the operation, both the top and the bottom ends of the holes are chamfered. In position No. 6, the piston holes are reamed to a diameter of 1.0475 inches, allowing sufficient stock for final boring and honing.

After the piston pin holes have been processed on the first machine, the parts are sawed in another operation to produce rods and caps. In the second center column machine the two holes for attaching the caps to the rods are drilled, chamfered and reamed for a later threading of the screw holes.

In this second machine, the parts are loaded vertically in the fixture, locating on the reamed piston pin holes in position No. 1. In position No. 2, two 23/64 inch diameter holes are drilled halfway through. In position No. 3, these holes are drilled through and to a diameter of 0.316 inch. In position No. 4, the two holes are chamfered. In position No. 5, a combination two-diameter finish ream is made to 0.3383 of an inch and 0.3823 of an inch after which the workpieces are unloaded.

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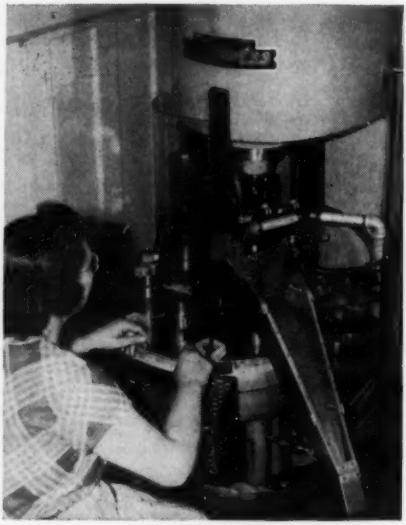
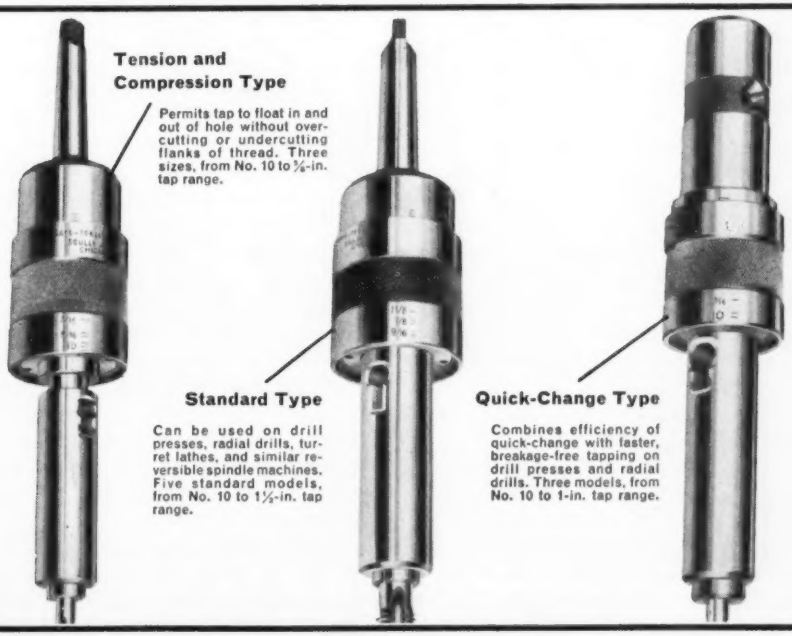
New Tooling Doubles Metal Filter Production Rate

Ten thousand filters are being produced each day, doubling the previous method of production. One non-skilled laborer can now perform the task which formerly required four to five skilled employ-



The forming of stainless steel fibers for the injection system of internal combustion engines is accomplished efficiently and economically on this pressing machine.

How to make "guaranteed annual profits" on your tapping operations


Tension and Compression Type
Permits tap to float in and out of hole without overcutting or undercutting flanks of thread. Three sizes, from No. 10 to ⅝-in. tap range.
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Can be used on drill presses, radial drills, turret lathes, and similar reversible spindle machines. Five standard models, from No. 10 to 1½-in. tap range.
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Combines efficiency of quick-change with faster, breakage-free tapping on drill presses and radial drills. Three models, from No. 10 to 1-in. tap range.

Scully-Jones "SAFE-TORQUE" tap drivers stop breakage, increase production, reduce salvage costs

EXAMPLE: Efficiency increased 10 per cent on a radial drill, tapping blind holes in steel cases. Tap life increased 400 per cent.

Now you can increase spindle speeds when tapping on single- or multiple-spindle machines, with guaranteed profitability . . . because Scully-Jones "SAFE-TORQUE" tap drivers practically eliminate breakage. On one job, for example, only two taps were broken out of a run of 500,000 holes—former average was a broken tap for every 200 holes.

If you're breaking taps, chances are the cost of salvaging parts would more than pay for the driver. Instant and complete release below the break strength of the tap practically eliminates costly rework, scrap, and machine downtime due to tap breakage.

The difference between the Scully-Jones "SAFE-TORQUE" tap driver and other tools on the market is the overrunning roller drive and freewheeling release. There are no vibrating ratchet teeth, no friction discs or cones to heat up and change the torque setting. Torque remains constant no matter how many times the driver releases. You get dependable protection against hard spots, inadequate lubrication, dull or improperly sharpened taps, bottoming in blind holes, and other adverse machining conditions that reduce efficiency and increase costs. Write for complete information in Bulletin No. 20-50. Scully-Jones and Company, 1909 S. Rockwell St., Chicago 8, Illinois.

SCULLY JONES **PRECISION HOLDING TOOLS**

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ees. Few filters are now rejected due to faulty pressing. A product of greater quality in uniformity and performance has been produced.

These represent a considerable savings in cost and material, which has been realized through the use of hydraulic press methods by the Metal Textile Corporation. This installation of Denison Multipresses produces, among other things, filters such as those used in fuel injection for internal combustion engines. The filter for use in fuel injection must be perfectly smooth, no small fibers can be exposed which might break off and enter the system.

The dies are all mounted on the removable bolster plate on the rotary table. By simply removing four bolts, one bolster and set of dies can be removed and another set installed for a different job. The optional ejection station is powered by a small hydraulic cylinder which is factory installed and connected into the hydraulic circuit.

A tamping station connected to the ram arm one station ahead of the ram presses the wire fabric into the die cavity.

The old method of producing these filters involved five sets of loose tooling. The stainless steel fabric was loaded by hand. Then the punch was inserted by hand. The load and punch were then placed under the ram and the pressing stroke accomplished. The unit was then taken to the unloader where the punch and the part were separated. The tools were sent back to the loader again for make ready. The life of a die was quite short and two men were kept continuously busy, keeping the dies in usuable condition. There were a total of five people involved in this pressing operation, not counting the die maintenance crew.

The present operation is performed by an 8-ton Multipress with a six-station index table. A single operator performs the complete operation. The operator places the stainless steel 0.0045 inch wire fabric in clips on the station cavities as they pass by. A small tamp connected to the press ram tamps the filter material into the die cavities prior to the pressing station. At the next station the filters are formed by the stroke of the ram which has been accurately gauged and set. At the next station the finished filters are ejected by means of an auxiliary hydraulic cylinder into a receiving chute.

This new method has cut cost, increased safety, improved quality, reduced waste, and doubled rate of production.

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YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON / "TU-LIP" COUNTERBORES FOR FAST, FREE CUTTING

As the name implies, WELDON "Tu-Lip" counterbores have only two cutting lips or flutes. This feature, together with the fast spiral, makes the "Tu-Lip" the fastest, freest cutting counterbore on the market.

Breakage due to clogging is prevented because this improved cutting tool provides more than ample chip room. Furnished singly in sizes desired or in convenient wood block sets as illustrated.

Catalog list numbers are now marked on all Weldon tools and holders as an aid when reordering . . . another WELDON FIRST.

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ideas from readers

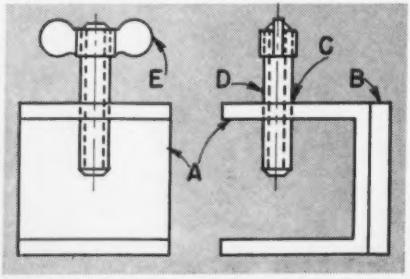
ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

Quick-Acting "C" Clamp

By ROBERT HILL

When the need arises for a small "C" clamp and such equipment is not readily available, a clamp of the design shown in the accompanying sketch has been found to suffice. The clamp consists of a 2-inch long piece of channel iron, *A*, and a piece of flat stock, *B*, which is brazed flush to the piece, *A*, as shown, to provide a back support. The piece, *B*, should not be less than ¼ inch in thickness so as to provide sufficient strength to the clamp. A hole, *C*, is drilled and tapped in the piece, *A*, to accommodate a pressure screw, *D*, as shown. A large wing nut, *E*, is soldered on the end of the screw, *D*, for turning same. An outstanding advantage of this clamp is the large holding capacity provided for the small clamp size.



Sketch of simple quick-acting "C" clamp.

★ modern machine shop ★

Retruing Drill Chuck Jaws

By H. J. GERBER

In our shop we have had considerable success with the method illustrated herewith for restoring the trueness of jaws on drill chucks. We have found that, in many cases, the internal gripping surfaces of the jaws are worn so badly that they must be ground. The greatest difficulty in performing this operation is to maintain the jaws in the same position as when they are gripping a drill.

Since most of these chucks are mounted on taper shanks, we install each chuck directly in the taper socket of the head spindle of an engine lathe for regrinding. Considerable care is taken to remove

Fig. 1—Soldering jaws of drill chuck to nose of chuck body. Drill blank gripped in jaws is removed when soldering is completed.

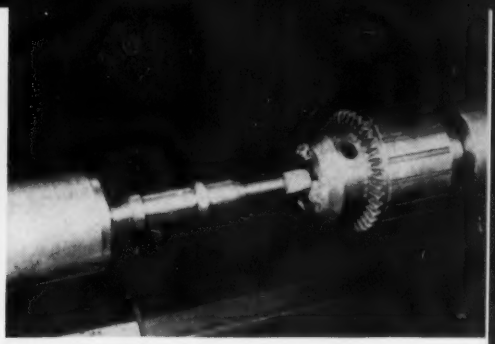


Fig. 2—Internally grinding jaw faces with tool post grinder. When grinding is completed, solder is removed to free the jaws.

burrs or other imperfections from the shank so that it can be firmly seated in the lathe spindle socket. A hardened and ground drill blank, approximately ½ inch in diameter, is first gripped firmly in the chuck jaws, and each jaw is then lightly soldered to the body nose of the chuck, as shown in Fig. 1. The rod is then removed by gripping it and twisting it free with a pair of pliers. This leaves the jaws temporarily secured to the chuck body in the same position they will assume when gripping a drill shank.

As shown in Fig. 2, a tool post grinder mounted on the lathe carriage is now used to internally grind the jaw faces as the chuck is revolved in the rotating lathe spindle. In order to correct both taper and eccentric conditions, it is merely necessary to "spark out" each jaw. When grinding is completed, the solder is melted off the jaws, and the chuck is washed in a solvent to remove abrasive dust.

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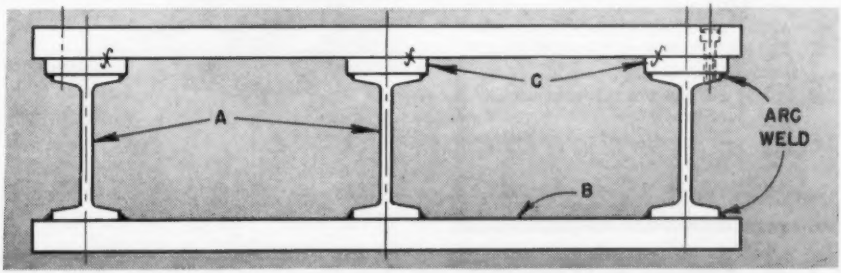
Base Design for Heavy Machines

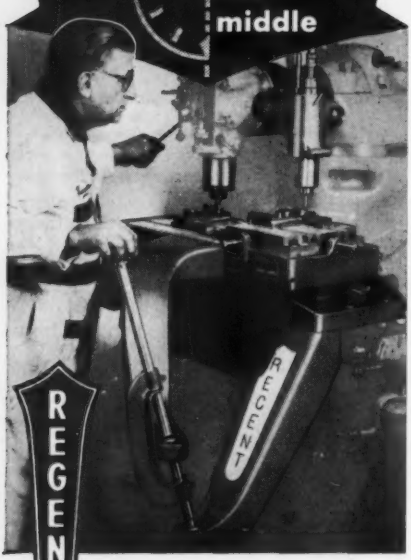
By ROGER ISETTS

When designing heavy special machines it is often necessary to provide a rigid base. This is especially true if the machine is subject to extreme vibration or shock loads. The illustrated method of making a built-up section using standard I-



Sketch of base design for heavy machines which provides for sturdy, economical construction.

CUT PRODUCTION TIME
. . . right down the middle



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Save up to 50% and more machining time on contoured parts with both the R-200 and R-300 models. Single-lever control allows operators to duplicate complex parts in a fraction of the usual time.

R-200 — 2-Dimensional Profiler for any vertical miller
R-300 — 2- and 3- Dimensional for Bridgeport millers
Capacity: 6" x 6" (7" x 6" Special)
1 to 1 ratio with master

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beams not only provides for sturdy construction but maximum economy as well.

Two or more I-beams, *A*, (depending on the size of the machine) are welded directly to a mild steel plate, *B*. On top of the beams spacer pads, *C*, are welded. These pads are machined off and the machine proper can be bolted to them. The size and spacing of the I-beams necessary to carry the load can easily be determined by means of simple stress calculations.

★ modern machine shop ★

Simple Fixture Facilitates Cutting Off of Large Diameter Stock

By IRA S. ROBERTS

Difficulty is often encountered when two pieces of large diameter round bar stock are set up together in a power hack saw for cutting off.

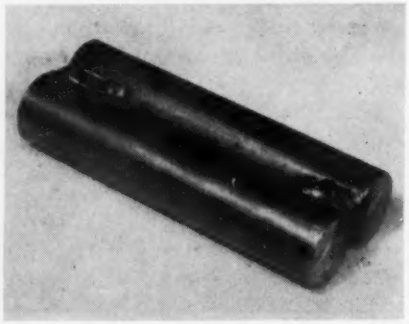
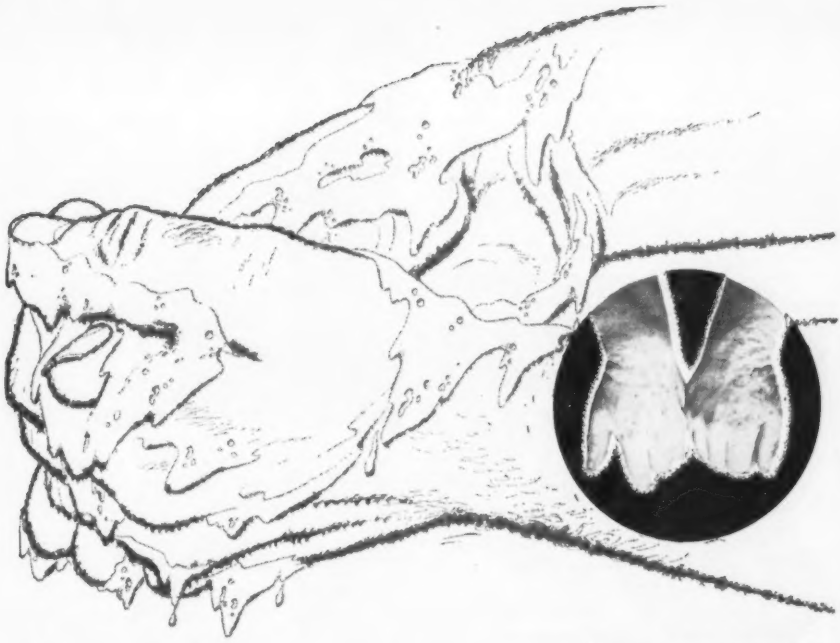


Fig. 1—Two smaller pieces of round bar stock of equal diameter are welded together so as to form a sort of double "V" block.



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Cleanliness removes the cause of dermatitis — prevents prolonged contact with chemicals, oils, abrasive dust and other skin hazards.

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The West Program of Dermatitis Prevention and Control is an inexpensive way to eliminate the needless penalties and costs of dermatitis. Why not discuss it with one of our specialists? His recommendations will be tailored to your needs. Just send the coupon. Or call your local West Office.

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☐ Please send your 24 page booklet, "The Control of Dermatitis in Industry."
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The pieces have a tendency to rotate in the vise, and the result is usually a broken saw blade.

A simple remedy is illustrated herewith. Two smaller pieces of round bar stock of equal diameter are welded together to form a sort of double "V" block, as shown in Fig. 1. This unit is then placed between the two larger bars and the entire assembly is clamped firmly in the vise, as shown in Fig. 2. The increased contact area between the bars prevents any movement of the work in the vise and, at the same time, prevents any tendency for one bar to lift above the other when the vise is being pulled up tight.

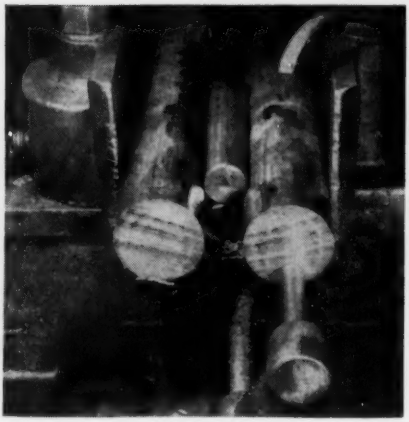

Fig. 2—The double "V" block is then placed between the two larger bars and the entire assembly is clamped firmly in the vise.

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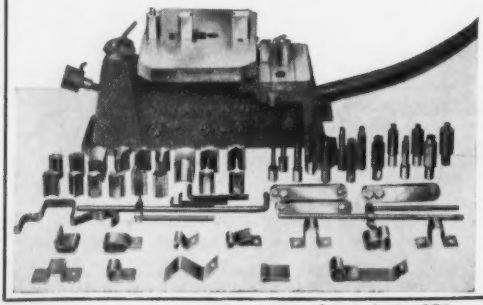

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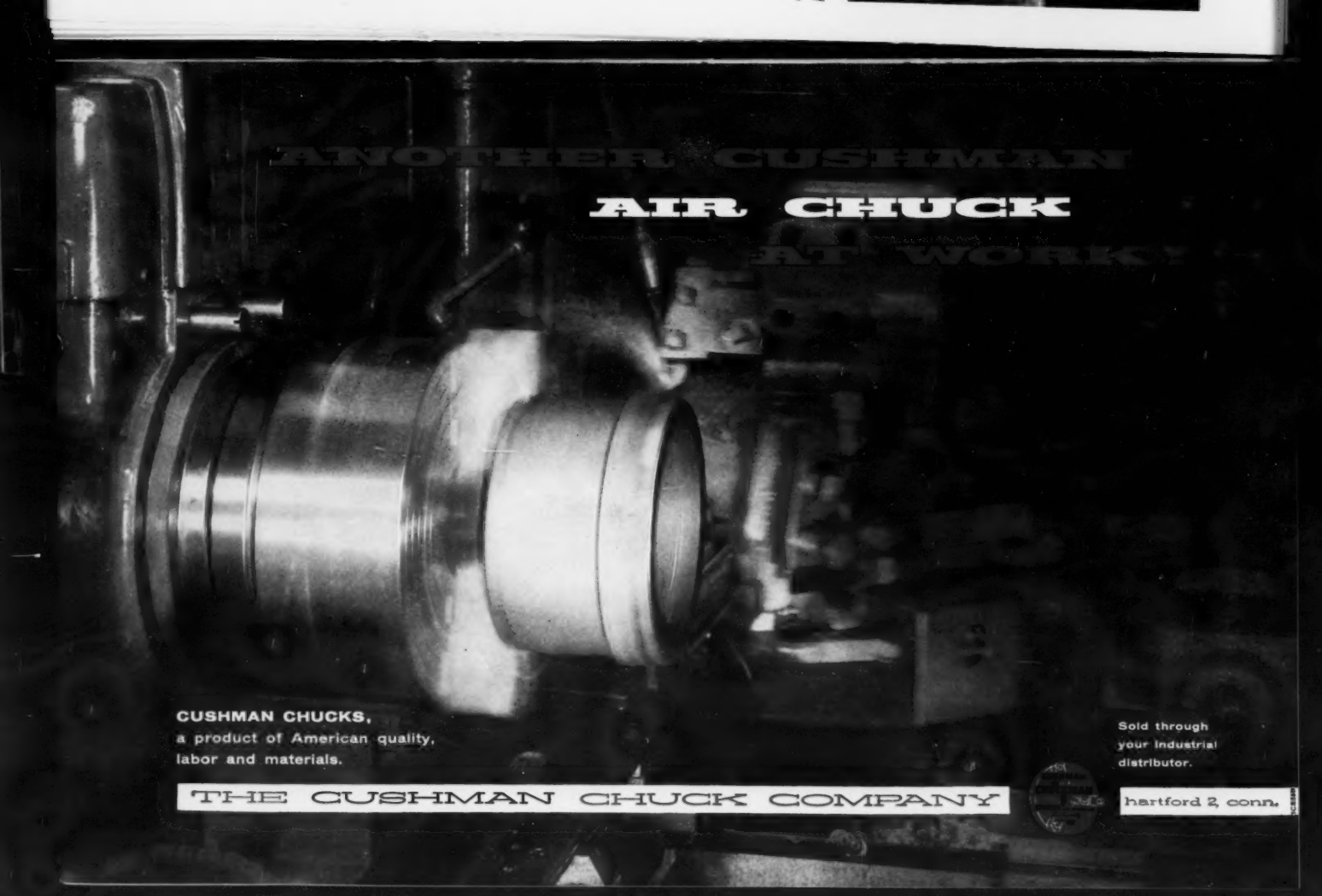
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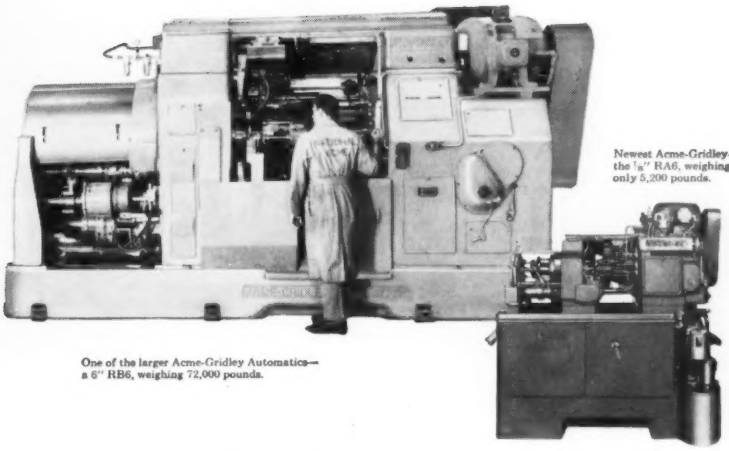

Newest Acme-Gridley—the 7/8" RA6, weighing only 5,200 pounds.

One of the larger Acme-Gridley Automatics—a 6" RB6, weighing 72,000 pounds.

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The advantage applies to parts weighing fractions of ounces or hundreds of pounds. And the wide-open tooling zone of every Acme-Gridley lends itself to a broad range of installations limited only by the tool engineer's ingenuity. It means that, for sheer capacity range, no line of automatic production equipment in the world equals Acme-Gridley.

If you produce parts like the ones illustrated, then Acme-Gridley Automatics must be in your present plans. Our representative can give you expert assistance without obligation.

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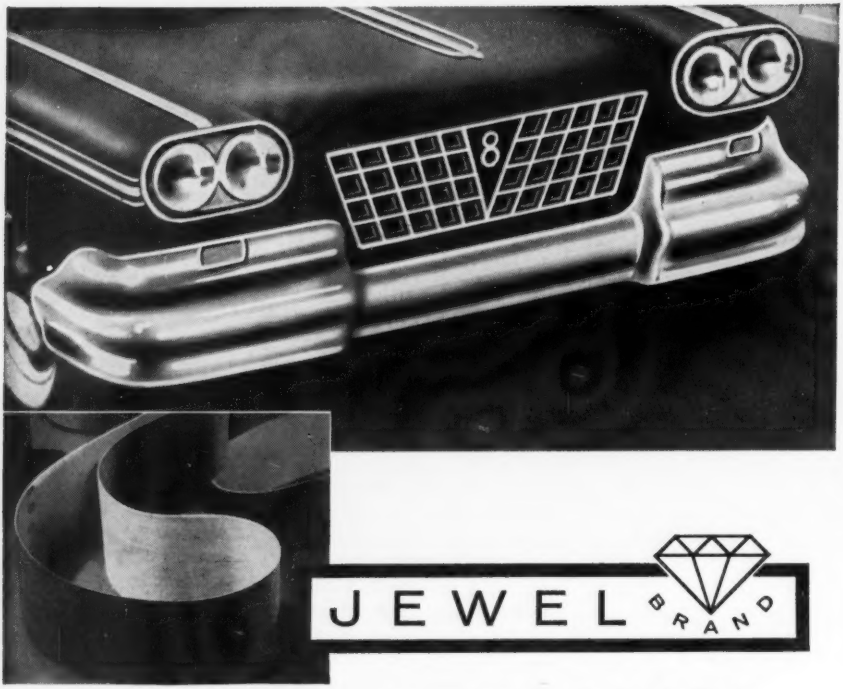

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Hard-facing pump rod with the Metco Type P ThermoSpray Gun

High spraying speeds—high deposit efficiencies —simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY Hard-Facing Alloys, these disadvantages have been overcome.

The THERMOSPRAY GUN is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The THERMOSPRAY Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.

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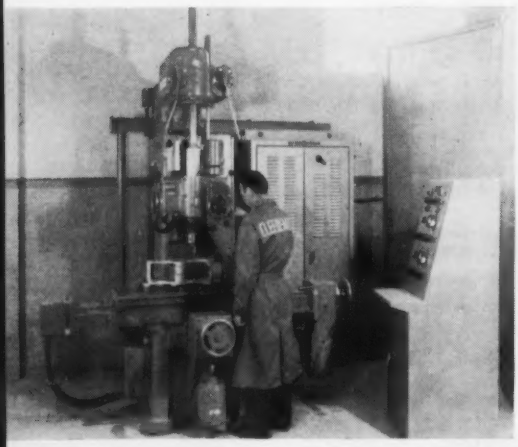
new shop equipment

Descriptions of new machines, tools and materials for metalworking.

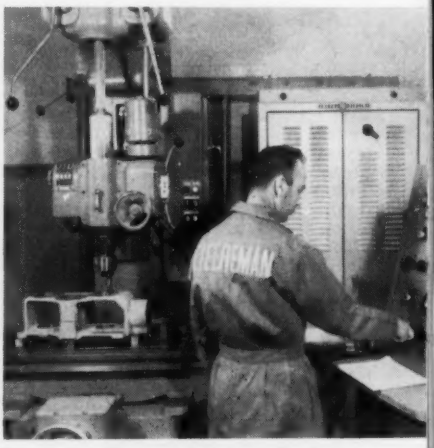
LAYOUT DRILLING MACHINE FEATURES NUMERICAL POSITIONING TAPE CONTROL

Cleereman Machine Tool Corp., Green Bay, Wis., has announced that the application of numerical positioning control to its layout drilling machine has been engineered with one thought in mind — namely, to yield positive savings in both overall machining cost and time.

The standard layout drilling machine was designed as an accurate drilling and boring machine for toolroom work and medium to small lot production runs. This makes it ideally suited for the application of tape control. The numerical positioning tape control system overcomes limitations inherent in manual positioning operation without altering the machine's purpose, versatility or basic functions. Tedious and time consuming jobs associated with conventional positioning means, such as studying prints, reading scales and verniers, laying out hole locations and using hand gages, have



Cleereman Layout Drilling Machine has been designed to bring toolroom accuracy and convenience to the production floor



Cleereman Layout Drilling Machine operator is shown setting up dimensions on the numerical positioning control console

and shop materials

Edited by L. L. BALDHOFF

been eliminated. The numerical system receives all the necessary positioning instructions from the tape and converts these instructions into commands to the machine. Once a workpiece has been clamped onto the table it is automatically positioned under the spindle to successive hole locations, as machining operations are completed without wasted time or motion. Table and carriage coordinate locations can be programmed in a definite sequence established to give optimum efficiency.

Preparation of a punched tape, accomplished in minutes, replaces the cost and long lead time required to design and fabricate jigs and fixtures necessary to manufacture parts on conventional production machines. Compared with other methods of machining, it is claimed that savings are also realized by eliminating time lost in handling jigs and fixtures. Setups are made with ease and, since only locating stops or a simple holding fixture is needed for the most complex workpiece, loading and unloading time is substantially decreased.

Because machining need not be stopped to make periodic measurements and adjustments, productive operation is nearly continuous. Human error is minimized by numerical positioning control, reducing the production of scrap. Therefore, with more usable parts produced with less setup and fatigue time, the machine in effect works more productive hours each day. Another saving is gained by the fact that machine operators with less knowledge and experience can be successfully used, conserving skilled labor. The machine is so nearly automatic that many jobs will permit one operator to attend two machines.

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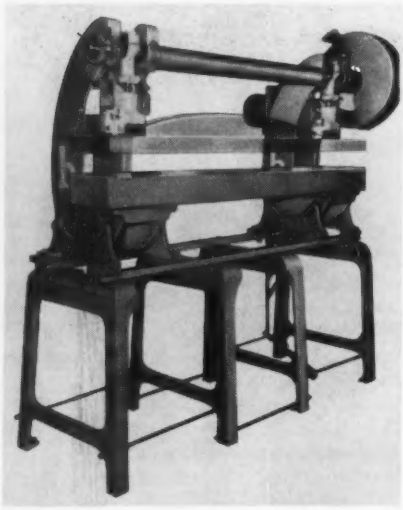
8 TON PRESS HAS BEEN DESIGNED FOR GASKET CUTTING

Benchmaster Manufacturing Co., 1835 West Rosecrans Ave., Gardena, Calif., has introduced the special press, shown in the accompanying illustration, which is said to offer advantages for stamping, forming or trimming operations on relatively large material of light gauge or soft composition. Designed originally for a manufacturer of gaskets, this combination press serves equally well when used on rubbed sheets, cloth, cork, plastics and some light gauge metals or foils.

The two presses are of 8 ton capacity, both rams operated simultaneously by means of a shaft equipped with universal joints at each end. Since



Benchmaster 8 Ton Multi-Ram Press

only one flywheel is used, the total capacity remains at 8 tons.

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DERUSTING COMPOUND

Rustbuster, developed by Octagon Process, Inc., 15 Bank St., Staten Island 1, N. Y., is an alkaline derusting and descaling compound which has been designed to solve bottlenecks in removing deep pitted rust and difficult heat scale from sheet, plate, structural steel and precision parts and tools. Light oil and grease films, remaining after fabricating operations, are removed at the same time, leaving a chemically clean surface.

Rustbuster is available from stock in 100 and 400 pound drums.

For more data circle 88 on Postpaid Card

FLEXIBLE POWER STRAIGHTENING PRESS

A line of Flexible Power Straightening Presses, designed for both high production operations and small shops, has been announced by General Manufacturing Co., 6430 Farnsworth Ave., Detroit 11, Mich. Precision built for hot or cold straightening operations, the presses feature a pneumatic-mechanical operating principle to bring a new measure of sensitivity to press operation.

Sensitivity is maintained from the slowest ram movement to snap action, even at maximum press power. The operator can deflect the work a few thousandths at a time, controlling each movement through a constant-contact underside gage. Available in single ram models or three, four or five ram multiple head models with fully adjustable outside head positions, Flexible Power Presses range from 5 to 20 ton capacities.

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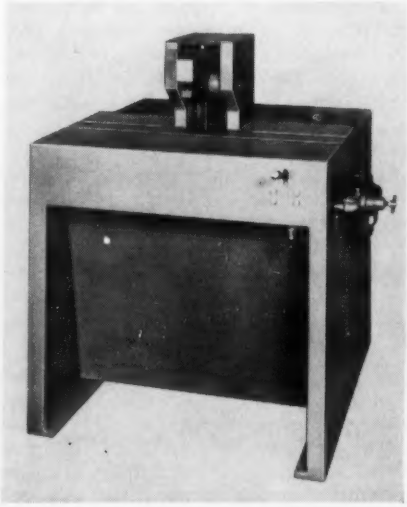

General Model 50A Straightening Press

CONTINUOUS MILLING OF SQUARES ON SMALL PARTS

The Robert E. Morris Co., 5004 Farmington Ave., West Hartford 7, Conn., has introduced a new technique for continuous milling of squares on a variety of small parts, utilizing a Nichols Semi-Automatic Miller equipped with a four station 10 inch diameter automatic pneumatic indexing table. The indexing table presents each part to two pairs of straddle milling cutters, leaving two stations free for loading and unloading while the miller is in operation. Automatic pneumatic downfeed to the spindle head is synchronized with table feed and automatic indexing of the rotary table. Two sides of the square are milled with each indexing cycle, the square being completed after one 90 degree index of the rotary table. Thus, the operation is continuous, with the operator required only to unload and load work.

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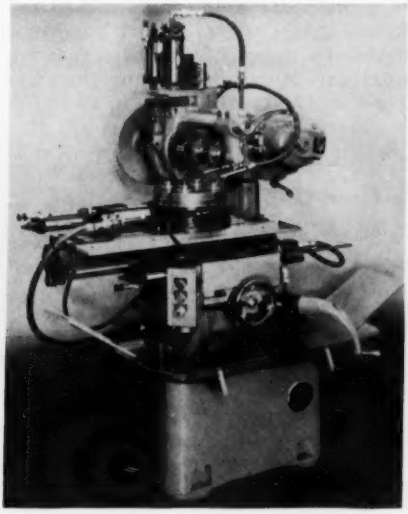
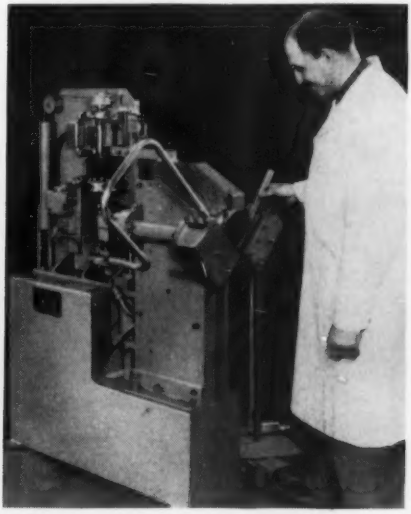


Nichols Semi-Automatic Milling Machine

3 TON HYDRAULIC TUBE BENDING PRESS

The Pines Engineering Co., Inc., 643 Walnut, Aurora, Ill., has announced a versatile 3 ton progressive bending press, built to speed bending of a broad range of small tube and pipe sizes. It makes up to ten bends of varying degrees, one bend at a time, in a single piece of material without the use of internal mandrels to support the inside of the tube, and without excessive flattening or distortion. The machine is unusually compact, requiring only ten square feet of floor space. The press has been designed to handle up to 1 inch o.d., 14 gauge steel tubing, and is capable of producing 1,000 to 1,500 bends per hour —depending upon the part being bent, material handling methods and the dexterity of the operator. The maximum radius is approximately 6 inches, and the minimum is 2½ to 3 times the tubing diameter, depending upon wall thickness. In a 1 inch tube, the



Pines 3 Ton Hydraulic Tube Bending Press

maximum degree of bend is 130 degrees on a 3 inch c.l.r.; 60 degrees on a 6 inch c.l.r. The minimum distance between bends is approximately two to three times the tubing diameter.

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LAYOUT MACHINE

Portage Double Quick, Inc., 1041 Sweitzer Ave., Akron 11, Ohio, has announced a layout machine. Layout work can be accomplished from five sides, plus inside surface checks with only one setting of the casting. The workpiece or casting does not have to be clamped. Time normally wasted in repositioning angle plates, protractors and other hand tools is eliminated. The machine lays out and scribes vertical and horizontal lines on workpieces up to 48 inches vertically and 36 inches horizontally. Measuring unit of the machine permits scribing inside or outside lines for hole center location, finish allowance and casting clean up. Vertical and horizontal scales are marked off in inches with separate adjustable verniers reading to 1/16 inch. A lock is provided on the crossarm and column. The vertical scriber rotates 360 degrees and swings horizontally 180 degrees.

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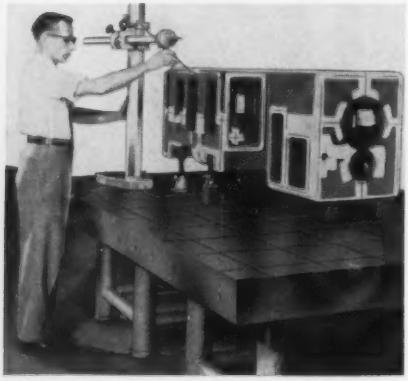
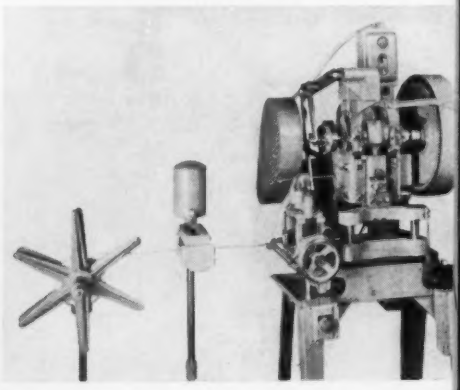
METAL TAG MARKING MACHINE

The Noble and Westbrook Manufacturing Co., 25 Westbrook St., East Hartford 8, Conn., has developed a press for producing "wrap-around" taps from coil stock of aluminum or other soft metals and alloys. The machine marks, punches a hole and cuts off tags of any length up to 7 inches, using ¾ inch wide coil stock. A tang is blanked on one end of the tag and an elongated hole or slot is punched at the opposite end. These tags are also marked with identification data which is set with interchangeable type in a multi-line holder mounted in the punch holder of the die set. Tags produced by this equipment are being used for identifying pneumatic, hy-



Portage Double Quick Layout Machine



Noblewest Metal Tag Marking Machine

draulic or electrical lines and are wrapped around tubing or piping with the tang inserted through the elongated slot and then bent over in the reverse direction.

The illustration shows a small stock reel and separate lubricating stand, furnished with the marking press.

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TAPS AVAILABLE IN LARGER SIZES

Besly-Welles Corp., 108 Dearborn Ave., South Beloit, Ill., has announced the addition of both 5/16 and ⅜ inch sizes in both NC and NF styles to its standard line of X-Press Taps—the tapping principle which cold forms internal threads in dustile metals without cutting and without chips.

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MULTIPLE SPINDLE DRILLING AND TAPPING MACHINE

A versatile multiple spindle machine, which drills and taps simultaneously and achieves production of 400 parts per hour, has been built by National Automatic Tool Co., Inc., Richmond, Ind. This machine is available with 16 or 24 spindles. Half of the spindles, located on one side of the head, are used for drilling and are driven by a standard electric motor. Those on the other side are driven by a high-reversal-duty hydraulic tapping motor.

The machine shown in the illustration is equipped with a simple five position push-through fixture for drilling and tapping front frames of electric typewriters.

The machine can be adapted to general purpose use at any time by substituting adjustable arm-type spindles for the slip spindles. This machine also may be obtained for step drilling, chamfering, counterboring or spotfacing.

Natco Drilling and Tapping Machine is available with either 16 or 24 spindles

In the machine illustrated, the table moves up and down hydraulically — rapid traverse up, feed up, feed down and rapid traverse down. Two feed rates may be used, with automatic change, if needed.

The same spindles which are used for drilling also may be used for tapping. This is achieved by turning a knurled ring which provides a half inch "float," making it possible to tap different leads at the same time.

Individual spindles have both high and low speeds. Also, speeds can be varied by changing the main drive speed. This is accomplished by means of a two speed shift and pick-off gear.

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new shop equipment . . .

REGISTER IMPRINTING

The Pannier Corp., 202 Sandusky St., Pittsburgh 12, Pa., has announced its deep throated automatic press which is ideally suited for filling-in (imprinting) knocked-down cartons. The simple-operated depth and width adjustments assure perfect alignment for accurate register printing. This unit is pneumatically operated with an air cylinder that requires only 30 to 35 pounds of pressure. When knocked-down cartons are hand fed into the printer, inserted material triggers the action to print and the automatic return of the printing head to its "rest" position. The operator controls printing speed because the unit works as rapidly as material can be fed into it.

The standard unit has a maximum printing surface of 5⅜ by 13 inches for printing either a solid die or a preset message made of interchangeable National Type. The solid die printing block or an interchangeable type holder can be easily changed in a matter of seconds because of a "snap in" and "snap out" design feature.

The press was designed to fill-in, in register, on knocked-down cartons, paper bags, small packages and even single sheets of paper.

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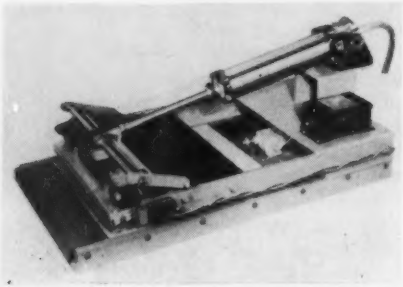

Pannier Deep Throated Automatic Printer

COMPLETE AUTOMATIC CYCLING IS AVAILABLE FOR SURFACE GRINDERS

Abrasive Machine Tool Co., East Providence, R. I., has announced that flats, slots, shoulders and shapes can now be ground automatically to close tolerances on its line of hydraulically powered Hydrabrasive Precision Surface Grinders. By setting the automatic down-feed to actuate either on the table or saddle reversal, the equipment will operate to preset tolerances. Depending upon the precision finish required, the unit can be set for either one, two or three spark-out passes before automatically shutting off.

The automatic down-feed is set with an infinite increment adjustment of from 0.0001 to 0.0025 inch on the elevating handwheel. This adjustment can be varied while the machine is in operation.

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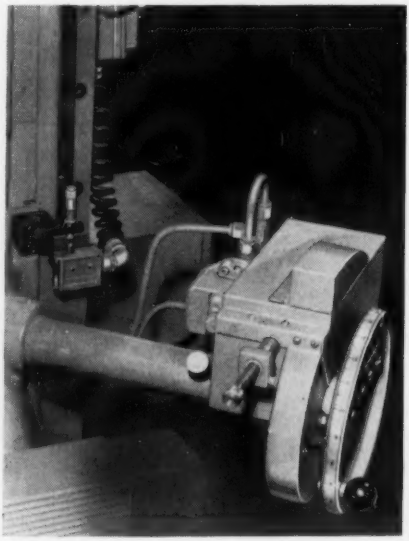

Complete automatic cycling is available on Hydrabrasive Precision Surface Grinders

for **LOW-COST, HIGH-SPEED**

PRODUCTION Turning

- ★ Push Button speed selection
- ★ Heavy duty power driven variable speed drive
- ★ Handwheel 6-station, 6½" stroke bed turret
- ★ Lever-operated cross slide with front and rear tool blocks
- ★ Lever-operated 1-1/16" draw bar collet attachment (1⅜" hole through spindle)
- ★ Zero-Precision taper roller spindle bearings
- ★ 13⅛" swing over bed ways
- ★ 2-HP Motor
- ★ Complete Line of accessories and attachments

SHELDON

Precision

TURRET LATHES

An extremely versatile, capable and fast, production tool for turning precision parts. Increases pieces per hour, lowers cost per piece. Lower tool investment, saves floor space, reduces power costs. Easily operated by anyone. Rapidly pays for itself in added profit. The extra capacity makes the lathe ideally suited for either high speed precision collet work or as a chucker.

This tool can be your answer to today's competition.

10", 11" and 13" Sheldon Lathes • Sheldon Variable-Speed Lathes • 13" and 15" Sebastian Geared Head Lathes • Sheldon Milling Machines • Sheldon Shapers.

Write for Turret Lathe Circular and General Catalog

SHELDON MACHINE CO., Inc. 4250 N. Knox Ave Chicago 41, Illinois

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AUTOMATIC NAMEPLATE MARKER

Geo. T. Schmidt, Inc., 1806 West Belle Plaine Ave., Chicago 13, Ill., has introduced an automatic nameplate marker, the basic unit of which is the Pneumark 10T Impact Bench Press.

The stacker feed has adjustable features to accommodate rectangular plates 1 to 2 inches wide and 2 to 4 inches long by 0.014 inch to 0.024 inch thick.

The unit is fully automatic in operation—the operator merely loads the feed stacker and unloads the marked plates from the discharge stacker.

This feed can be used with a serial numbering head for consecutive numbering. The plates are automatically stacked in numerical sequence after the marking operation has been completed.

By using drawer style upper chase, all details except serial number can be stamped in blank pads on plates.

Important features include: rapid setup for various plates; high production, compact bench style unit; 10 ton stamping capacity; uniform legible impression in plate; and production from 3,000 to 3,600 per hour.

For more data circle 98 on Postpaid Card

★ modern machine shop ★

ADJUSTABLE MOTOR BASE

Rampe Manufacturing Co., 14915 Woodworth Ave., Cleveland 10, Ohio, has introduced the Model MB-1 Adjustable Motor Base, which offers an exceptionally easy method of speed variation and belt take-up for fractional horsepower equipment with variable pitch sheaves. It has a maximum 1½ inch adjustment, precision made telescoping slide and lock nuts to limit movement. A knurled 1¼ inch knob and adjusting screw assure positive settings without slippage. The rigid base can be universally mounted in any position. It has been designed to handle all motors up to size 42 NEMA frame. The base measures 7½ inches long and 4¾ inches wide with overall 1¾ inch height.

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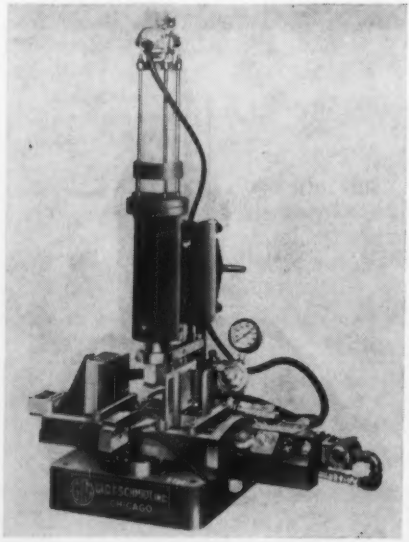
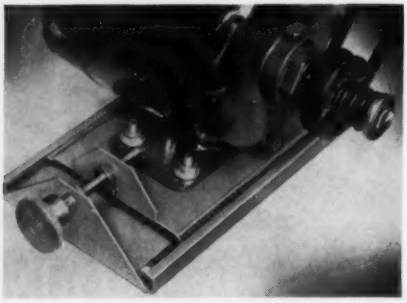


Pneumark Press with automatic stacker feed

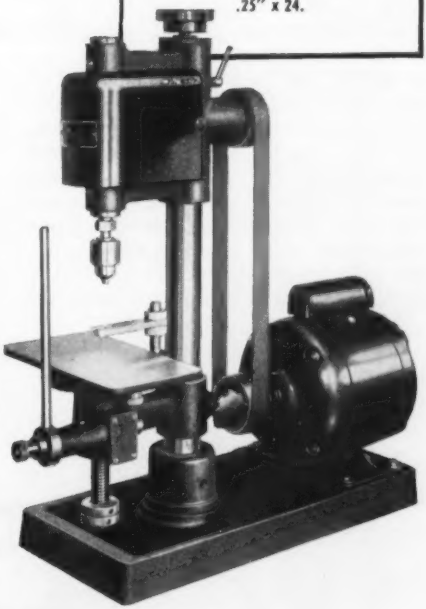


Rampe Model MB-1 Adjustable Motor Base

Now *Precision* TAPPING OF THIN AND BRITTLE MATERIALS

Hamilton Super Sensitive, Small-Hole, Precision Tapping Machine.

Capacity — .034" x 120 to .25" x 24.



Recent design change provides a simple homing device as a standard component of the

HAMILTON
SUPER SENSITIVE, SMALL-HOLE
PRECISION
TAPPING MACHINE

and makes routine of such problem work as the tapping of precision holes in thin metal sheets or in brittle plastics. Even improves performance in the tapping of blind holes!

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2463

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FEEDERS AND STRAIGHTENERS ADAPTED TO PROGRESSIVE DIE WORK

F. J. Littell Machine Co., 4163 Ravenswood Ave., Chicago 13, Ill., has announced that automatic roll lifters are now furnished as optional features on HRP Feeding Straightening Machines handling stock up to 0.050 by 24 or 0.125 inch by 4 inches.

Operated by air, the Littell Automatic Roll Lifter is electrically actuated by the ram of the press. The roll lifting operation is automatically coordinated into the straightening-feeding cycle. With perfect timing, the upper rolls are lifted clear of the stock, permitting the pilots to locate the stock perfectly on the die. Upon completion of the ram stroke, the upper rolls are automatically lowered to normal position in contact with the incoming stock to be straightened and fed in the next cycle.

As with the standard Littell HRP Machines, the feeding cycle, which consists of straightening, feeding to length, opening of pinch rolls and resetting for a new cycle; is automatically electrically controlled by means of the press.

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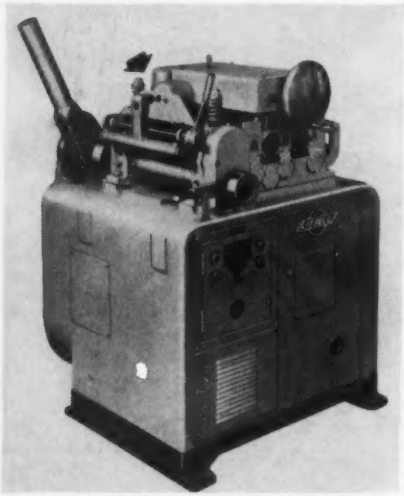

Automatic Roll Lifter on Littell HRP Hydraulic Feeding and Straightening Machine

★ modern machine shop ★

CONSTANT VELOCITY UNIVERSAL COUPLING

Stephen Morgenstern, 3217 Algonquin Parkway, Toledo 6, Ohio, has introduced a constant velocity universal coupling with a compensating unit. The purpose of the compensating unit is to keep the degree of angularity constant between the ring and forks of both the drive and the driven shafts. This movement eliminates the variation in speed between the two shafts and a constant angular velocity is obtained.

The coupling, as shown in the illustration, is set up for opertaion at approximately 65 degrees. However, operation at 75 degrees or more is said to be possible without detracting from its smooth operation. Also, it is claimed that the design characteristics of this coupling will permit high torque transmission.

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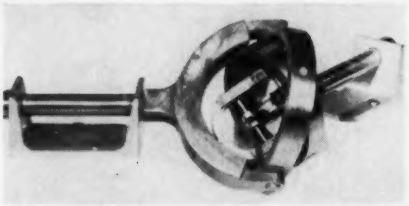

Constant Velocity Universal Coupling

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The Handy HAMILTON Portable, Elevating Table

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HEIGHT-
ADJUSTABLE
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●
TRUCK
●
WORK BENCH

for
DIE TRANSFER
●
MACHINE FEEDING
●
ASSEMBLY AT
BEST HEIGHT
IN BEST LIGHT

LIFTING
●
LOWERING
●
TRANSPORT
of
SHEETS
PLATES
BARS
TUBES
PIPES
TOOLS
DIES
FIXTURES
●
ALL
COMPACT HEAVY
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UNOBSTRUCTED
PERIMETER
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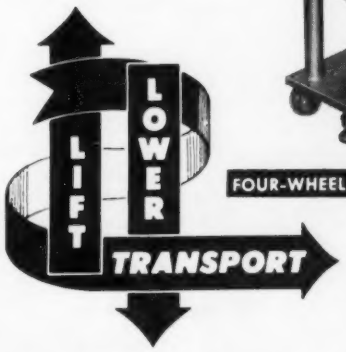
WORK FROM
ANY SIDE

MORE SERVICE for LESS MONEY than ANY Other Unit of Equipment

43 table surfaces
point support



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SIX-WHEEL MODELS

Recent changes and additions to the line provide greater capacities, new flexibility, *many bonus features*.

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Address THE HAMILTON TOOL COMPANY,
828 South Ninth Street, Hamilton, Ohio

IT'S A **Hamilton Tool**
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5604

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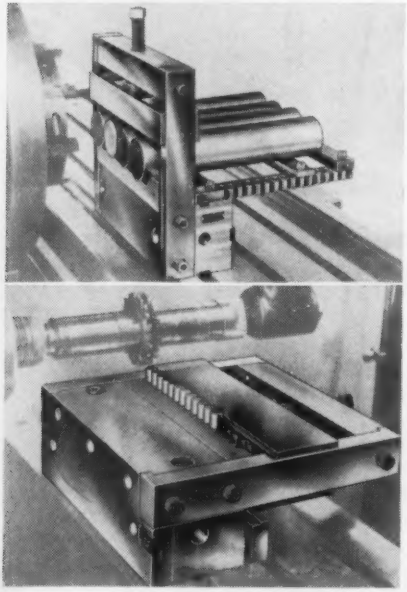
new shop equipment . . .

GANG FIXTURE FOR MILLING AND GRINDING OPERATIONS

Lassy Tool Co., Plainville, Conn., has introduced a gang fixture, which incorporates several features for accurate, efficient milling and grinding a number of pieces at the same time. Compensating jaws clamp each individual workpiece with equal pressure, even though the pieces may vary in size by as much as 1/32 inch. The springless clamping is positive and constant and may be controlled to suit the workpieces or operation.

The model shown in the illustration uses a conventional screw lock, but the fixtures can be adapted for either air or hydraulic locking. The fixtures can be used vertically or horizontally.



Vertical and horizontal applications of Lassy Gang Fixtures for milling and grinding

The Model GF-2 holds from four 2 inch round, square or oblong pieces, down to 128 1/16 inch pieces. Jaws for flat pieces hold up to 8 inch total lengths of any divided widths.

For more data circle 102 on Postpaid Card

★ modern machine shop ★

PERMANENT MAGNETIC MACHINE CHUCK

O. S. Walker Co., Inc., Worcester 6, Mass., has announced a permanent magnetic machine chuck which is 10 inches wide and 15 inches long. This size has formerly offered certain problems in holding work securely because of its nearly square shape. This No. 1015 Walker Chuck, however, will hold large or very thin parts with complete security on any part of the chuck face.

The on-off lever operates with extreme ease and is swivelled for further convenience. In the off position, the work is not only released, but is completely demagnetized.

The chuck weighs only 69 pounds and is just 2⅝ inches high, thus minimizing machine table inertia, while leaving maximum machine capacity. The face is all steel and has fine pole divisions and ¼ inch bar poles.

For more data circle 103 on Postpaid Card

O. S. Walker Permanent Magnetic Chuck

LABOR SAVING
Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.

CHUCK DIVISION
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new shop equipment . . .

ELECTRODE FOR GENERAL PRODUCTION AND MAINTENANCE WELDING

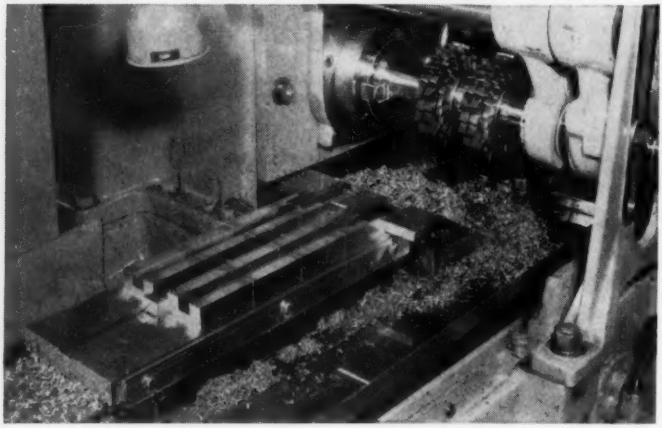
The Lincoln Electric Co., Dept. 3518, Cleveland 17, Ohio, has announced a new E-6012 electrode to reduce the cost of general production and maintenance welding. The company states that the design of the electrode coating, which includes the addition of iron powder, makes the electrode considerably easier to operate and faster than previous E-6012 designs. The electrode Fleetweld 7MP, is classed as an all position, a.c. and d.c., mild steel electrode.

The inclusion of a moderate amount of iron powder and certain arc stabilizing ingredients to the coating pro-

O. S. WALKER

CERAMIC MAGNET CHUCKS . . .

for fast milling set-up!



New Walker extra-power permanent ceramic magnet chucks* are now being used to practically eliminate set-up time on high speed gang milling operations. There are big savings in operating costs too.

Profit from—

- Increased operating speed • Automatic demagnetization of cutter and work
- Designed-in dimensional stability • Low chuck height and weight
- Low initial cost • Almost no operating cost

The use of ceramic magnet chucks as basic milling and grinding fixture plates promises even greater operational savings. For milling applications, a bottom plate with key slots is recommended.

Call your local dealer or O. S. Walker for details. **Patent applied for*

O. S. WALKER COMPANY, INC.

WORCESTER 6, MASSACHUSETTS, U. S. A.

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REDUCE TOOL GRINDING TIME

with **PRE-GROUND COMBINATION** Right & Left Hand **TOOL BIT** COBALT STEEL

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Trial bit, 3/8" sq. x 3", only $1.75 postpaid

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Cuts straight, angle or circle in copper, brass, tin up to 12 gauge steel, etc. Special steel blades ground and tempered, adjustable and replaceable.

CUTTING PRESSURE **20 times** the applied pressure

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open end blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money tool

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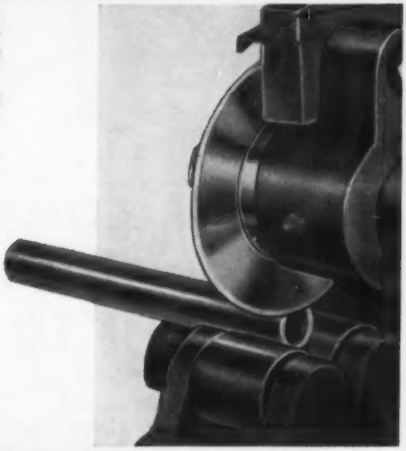
Continental Pipe & Tube Cut-Off Wheels

HI-ALLOY for LOW COST CUTS

More cuts between sharpenings—made of Shok-Resisto steel. For Continental and other rotary cut-off machines. Send for CUT-OFF WHEEL CHART . . . *shows correct cutting bevels.*



Continental machine co.

SINCE 1919

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duces an electrode said to combine the ease of operation, good bead appearance and a.c. operation of an E-6013 electrode with the higher speeds and lower cost of an E-6012 electrode.

This electrode is available in the 1/8, 5/32 and 3/16 inch sizes.

For more data circle 106 on Postpaid Card

PRECISION PNEUMATIC PRESS

Two high precision presses for all types of production and assembly operations are now available from American Lip Corp., 610 Fifth Ave., New York 20, N. Y. The Model PH 2 has a force of 500 pounds and the PH 3 exerts 1,700 pounds. Both machines operate on 85 pounds air line pressure.

Built into these units is a micrometer depth stop with a guaranteed accuracy of 0.0001 inch. The length of stroke is adjustable from 0.004 to 1.18 inch. Ram speed is set by a variable control which does not alter applied force. Independent settings for separate downward and upward stroke speeds are featured on the PH 3. Bases have tee slots to simplify fixture mounting. Applied pressure of both machines can be reduced by lowering the air line pressure.

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Pneumatic Press

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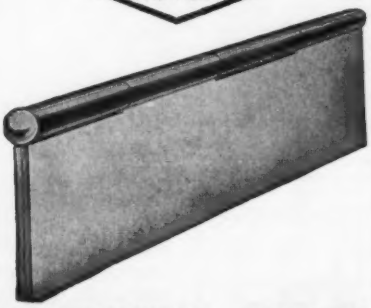

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AIR CYLINDERS
AIR VALVES & CLAMPS
DIAL FEED TABLES

MMS-8

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255 East 2nd St., Mineola, N. Y.

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Company.....

Address.....

City..... **Zone**..... **State**.....

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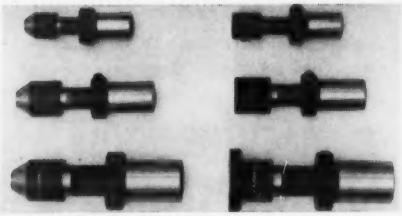
ADJUSTABLE REVOLVING TURRET BAR STOP

O K Machine Co., 3066 Lima St., Burbank, Calif., has designed and manufactured a bar stop that can be used on all screw machines to feed bar stock or tubing to specified length. Made in three sizes with 5/8, 3/4 and 1 inch shank, the O K Bar Stop is available with two types of heads — cone type for most bar jobs and a flange type for machining tubing or for machining stock to the maximum collet capacity of the machine.



O K Adjustable Revolving Turret Bar Stops

The adjustable length of the bar stop eliminates the need for several stops of different lengths. Correction or change in specified length can be made without removing from the machine. The length setting can be held infinitely — cannot push back in the turret, regardless of the pressure on the bar feed. Interchangeable heads can be changed in seconds, on the machine. The revolving head prevents marring of the end of a part and a slight center hole in the head allows for cut-off burr.

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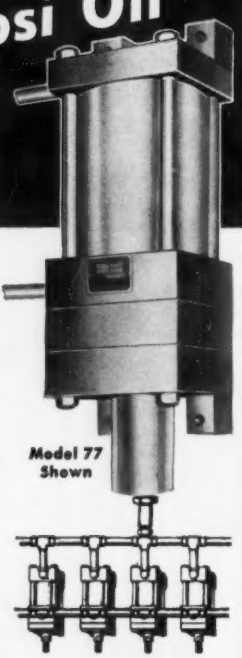
from
Shop Air!

Miller AIR TO HYDRAULIC
BOOSTERS

No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED (ratios up to 100 to 1) Hydraulic Power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. High pressure booster output drives the hydraulic work cylinders and can be directly applied (without cylinders) in testing, measuring, other applications. Boosters save air, space, weight, require little or no maintenance, and hold pressure as long as desired without additional power consumption. Models for immediate delivery.



Model 77 Shown

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Saves labor and speeds coil handling. One man can lift, turn, and load coil with a single, easy motion. Positive grip and support eliminate coil damage, assure operator safety. Forged steel wedge separates coils easily. Standard sizes up to 15,000 lb. capacity available from stock.

Lifts and turns in one motion.

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Equipment for Automatic Parts Handling and Assembly

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of this model

Vimcolights are UL listed

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REPLACE WORN MACHINE LIGHTS **NOW**

HERE IS THE LIGHT THAT MADE VIMCO FAMOUS

Side Mounting Type

No. A-15-7-50. This model consists of an "L" shaped, heavy gauge steel bracket for side mounting. With an 15" heavy duty flexible arm that withstands vibration. The cone shaped reflector is 3" in diameter, heat resistant and ruggedly designed for mill or vibration service. Socket is the push thru standard size.

VIMCO LIGHTS ARE INSTANTLY ADJUSTABLE

Six standard models with or without extension tubes, straight or angle sockets and a variety of base fittings are available. Write today for your free folder showing the complete line.

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Please bill me ..... ☐

Send COD ..... ☐

My check enclosed ..... ☐

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AIR TURBINE GRINDER FEATURES LEFT HAND ROTATION

Onsrud Machine Works, Inc., Portable Tool Division, 7738 Lehigh Ave., Niles 31, Ill., has introduced an air turbine grinder with left hand rotation for mounting on milling machines or machine grinders. Since the left hand rotation is in the same direction as standard machine grinder spindle rotation, any standard dust collection setup may be used with the tool. Typical applications of this high speed grinder include slot and depth grinding, tool chip breaker grinding and cutter sharpening. This Onsrud DIA-LH Air Turbine Grinder operates at 50,000 r.p.m. at the low air consumption rate of only 8 c.f.m. Its ¼ h.p. is ample for any work resistance with grinding wheels up to ½ inch in diameter. It has been preloaded in order to control end play to a 0.0002 inch tolerance.

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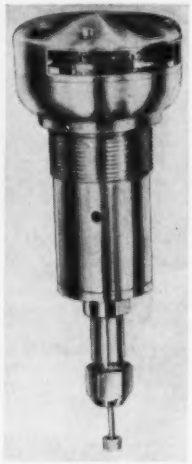

Onsurd Model DIA-LH Air Turbine Grinder has left hand rotation

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HIGH SPEED STEEL

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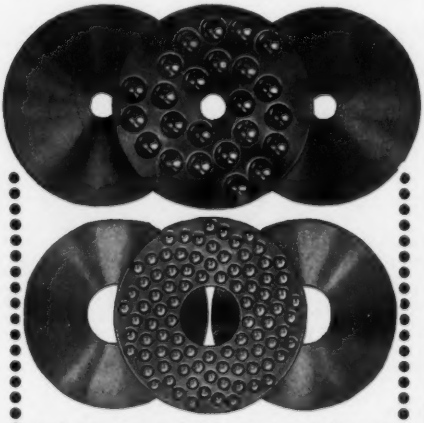

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FOR

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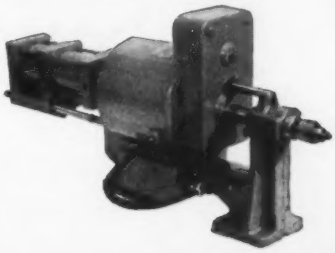
Hi-Speed Production Drilling .010" to ½" dia.



3 MODELS

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1,000 to 10,000 RPM or 2,500 to 15,000 RPM. Continuously variable speed control.

1/4" capacity—Model 113
15 Speeds—750 to 15,800 RPM.

1/2" capacity—Model 603
600 to 4,000 RPM with Variable Sheaves.

Check these features:

- Instant Finger-tip Drill Speed Selection
- Controlled Air Hydraulic Feed
- Electric Motor Spindle
- Positive Depth Stop
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FREE Descriptive Bulletin

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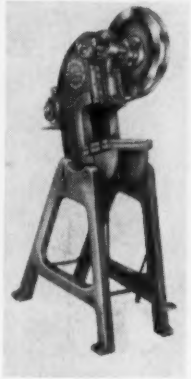
new shop equipment . . .

12 TON POWER PUNCH PRESS TILTS 30 DEGREES

Alva Allen Industries, Dept. MM, Clinton, Mo., has introduced the Model BT-12 Power Punch Press, which is a rugged, dependable 12 ton press designed to give long, trouble free performance. The frame is of high quality grey iron with supports and ribs at all points subject to strain. The bronze bearing flywheel is 160 pounds, assuring ample press power. The crankshaft is 1¾ inches in diameter, turned, ground and polished, and has a tension adjustable brake. Large, bronze main bearings are 1¾ inches in diameter and 3 inches long. Specially designed, hardened striking pins in the flywheel team with the new hardened clutch engaging pin to give positive, reliable action. The clutch is of the single pin, knife type design with all contact parts hardened for long wearing life. It can be easily changed from repeat (single stroke) to non-repeat (continuous) action. The ram can be easily adjusted (full 1¾ inches) and locked in place.

For more data circle 111 on Postpaid Card



Alva Allen 12 Ton Power Punch Press

NEW BALANCED CUTTING ACTION

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THE ECONOMY MILL NEW DESIGN NEW CARBIDE

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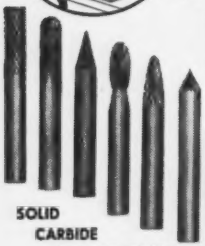

SOLID CARBIDE CUTTING HEADS

22 Shapes and Sizes Available

A NEW LOW PRICED HIGH CLASS PERFORMER

Made by the originator of ground-from-the-solid Rotary Files, and pioneer in this type of Carbide Mill, who presently offer the largest range of standard types, shapes, and sizes.

YOUR SPECIAL DEBURRING PROBLEMS ARE SOLICITED

OPERATE EFFICIENTLY AT USUAL CARBIDE SPEEDS, YET PERFORM BEAUTIFULLY AT THE SLOWER SPEEDS OF STEEL CUTTERS

PHONE, WIRE, OR WRITE US NOW FOR PRICES

Severance TOOL INDUSTRIES INC.

724 Iowa Avenue • Saginaw, Michigan

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CAMS

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring** and **Thread Grinding** facilities as well as modern **Cam Milling** and **Cam Grinding** equipment.

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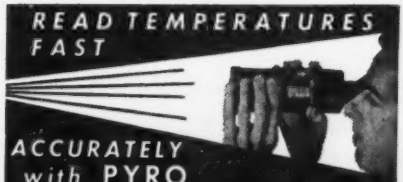

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Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

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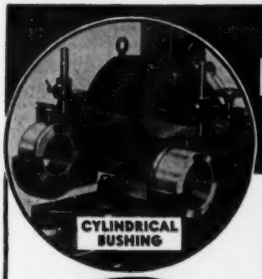
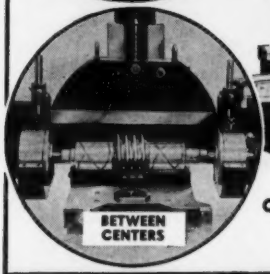
UNIVERSAL PARKSON GEAR TESTER

FOR SPUR - WORM AND HELICAL & BEVEL GEARS





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Scale and Vernier, Ease of adjustment, Convenient Features to hold Worm and Shaft on V-Blocks or Bushing.

PARKSONS ARE MADE IN SIZES
9" - 15" - 24/30" — PLAIN AND UNIVERSAL

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200-MM LAFAYETTE ST. • NEW YORK 12, N.Y.

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new shop equipment . . .

THROW AWAY INSERT MILLING CUTTER

Hardened-steel locking wedges placed behind the carbide inserts protect the cutter body in case of wrecks and smashups in a new line of throw away insert milling cutters, recently introduced by Wesson Co., Dept. AD, 1220 Woodward Heights Boulevard, Detroit 20, Mich. Since the wedge projects beyond the cutter body, maximum support is provided for the insert.

The wedge-anvil rides up and down on a differential screw and inserts can be loosened for indexing or changing. Standard, square solid carbide inserts give eight cutting edges and, because the insert locates against a precision pin, no gaging is required in indexing or changing. Total run-out of insert seats does not exceed plus or minus 0.0003 inch, it is claimed.

Depending upon the inserts used, these cutters can mill steel or cast iron. They can take roughing or semi - finishing cuts. Since the same body can be used for cutting either material, cutter inventory is reduced.

Cutters have 7 degree negative radial and axial rake angles. The complete line of standard cutters is available in 15, 30, 45 and 87 degree lead angles.

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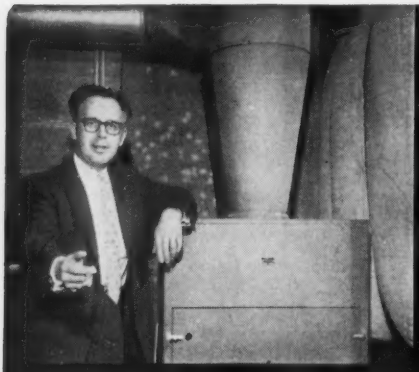
Wesson Milling Cutter



"TORIT dust collectors saved us $3,000."

FREE BOOKLET shows you how to trap harmful dust better at less cost with TORIT.

Your plant can have the same initial savings and cost-cutting operation now enjoyed by the Sico Manufacturing Company, national producers of tables and seating equipment. Sico President, Kermit H. Wilson states, " . . the lowest bid we had for a central dust collection system of minimum capacity was just under $4,000. Our $900 Torit installation has completely solved our dust problem and gives us greater flexibility than would be possible with a central system." There's a TORIT Collector to meet every type of dust problem, why not investigate?

FREE facts on TORIT DUST COLLECTORS that reduce maintenance costs, up production, improve employee morale. Write today to:

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296 Walnut Street, St. Paul 2, Minn., Dept. 702

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QUICKLY—on your SURFACE GRINDER—EASILY

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ORDER DIRECT on our 10 day money back guarantee

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Chatter Resistant, Spring Loaded Spindle
Hardened shaft—bearing adjustable for wear.
Diamond always perfectly centered.
Easily set adjustable 180° stops.
All surfaces ground true from hole.
CAPACITY—1½" convex to 4" concave.

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14" 20" 24" in stock, low price.

Ball Thrust Bearing.— 24 Precision Ground Surfaces. — DIAMOND BLOCK Slides In Ground & Lapped Housing, Can't Chatter. — Set Accurately With Protractor or Sine Bar to 1" of Arc. Largest Bearing Surfaces of Any Angle Dresser.

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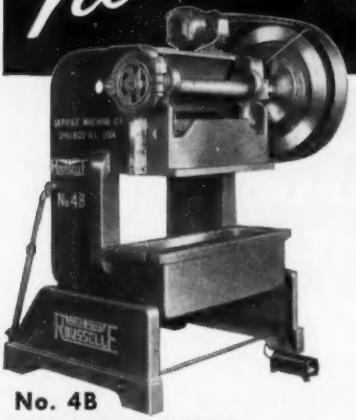

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- Large die area.
- Roller bearing flywheel.
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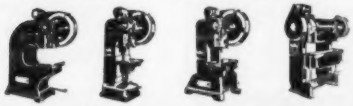
CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES



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Mfrs. of Rousselle Presses
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ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

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new shop equipment . . .

HEAD AUTOMATICALLY REPLACES WORN ABRASIVE MATERIAL

A coated abrasive head for finishing metals and woods carries a supply of abrasive for replenishing worn material. Designated as the Smooth-O-Matic, this head is available from Abrasive Machinery Corp., Dept. H-294, 444 South Pennsylvania St., Indianapolis 25, Indiana.

Designed to use either cloth or paper backed silica carbide or aluminum oxide abrasive, the material is fed from rolls which are automatically advanced by manual or solenoid activation. This Smooth-O-Matic Head may be used in portable tools or in permanent mountings. These units are highly adaptable to automated operations, when contours and flat surfaces alike require scratch finishes, ranging from satin to coarse finishes. It is particularly adaptable to aluminum finishing in preparation of extruded shapes for anodizing.

Heads are available in abrasive widths ranging from 2 inches to 50 inches. The recommended motor speed is 750 revolutions per minute.

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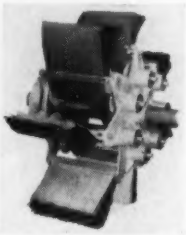
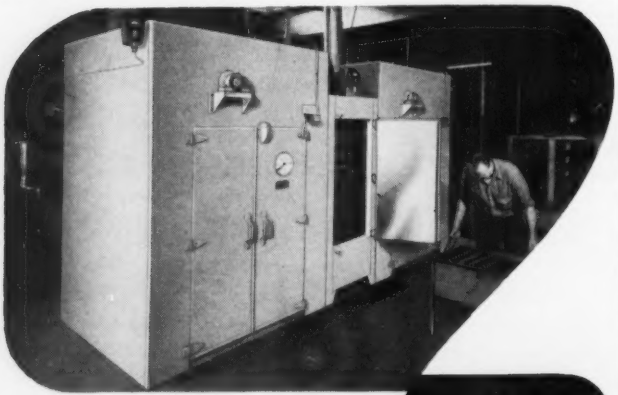


Smooth-O-Matic Coated Abrasive Head



Bake varnishes safely **with DESPATCH OVENS**

Portable Electric Tools, Inc., Chicago, uses six Despatch V-39 ovens and three Despatch RS-1 ovens to bake thousands of electric motor armatures and field coils every day.

The highly volatile gases released by varnishes baking at near 300° temperatures are carried off by the Despatch-designed exhaust system.

The forced exhaust is electrically timed to assure adequate ventilation at peak vapor periods—gravity exhaust carries on in the later stages of baking. Dual thermostatic systems guarantee accurate heat control.

Portable Electric Tools found that the racks designed for the truck loaded V-39 ovens could be conveniently used in the Batch type RS-1 oven—this fact, plus the high efficiency of the units resulted in a 50% production increase after installing the Despatch system.

Send for Bulletin 100

DESPATCH Established OVEN CO in 1902

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Spin Your Rivets Faster on the NOISELESS LINLEY RIVETER

Cut production costs with the Linley. Quickly produces finely finished rivets. Takes rivets up to ⅜" in diameter in iron and cold rolled steel; even larger sizes in brass, aluminum and other soft metals. Send sample parts to be riveted and without obligation we will give you cost and time estimates of doing the job the easy Linley way.

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LINLEY BROTHERS CO.

Also Builders of Jig Borers

671 State St. Ext., Bridgeport 1, Conn.

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Here's how to end your wage incentive problems for good!

BETTER WAGE INCENTIVES

By PHIL CARROLL, *Professional Engr.*

A practical guide, in the popular Carroll style, telling how to set up and effectively maintain a good incentive program. Especially shows the various types of incentive grievances, how to prevent them, and what to do about them if they arise. Includes information on incentives for foremen, incentive arbitration, and economics of incentives. **256 pages, 6 x 9, 70 illustrations, $4.75.**

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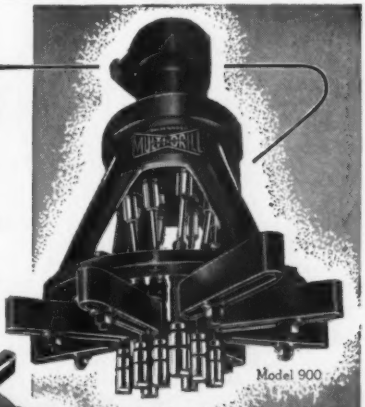
Adjustable MULTI-DRILL for Production Drilling

9" DRILLING AREA
AVAILABLE WITH 2 TO 8 SPINDLES

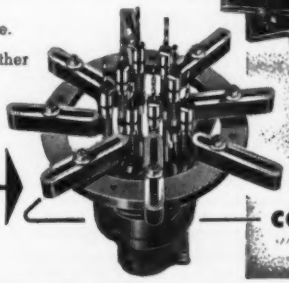
- Designed for accurate, high speed production drilling
- RUGGED CONSTRUCTION
- Quick, easy adjustments to **any** hole pattern on or within a 9" circle; ½" minimum center distances; Drill sizes 1/16" to 3/8"
- Special adaptations available.

MULTI-DRILLS are made in other sizes and models.

Write for details and name of your nearest Distributor.



Model 900



Locater arms are designed for fast, easy adjustment

Dependable Performance... proven by industry

FITS ANY DRILL PRESS

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The B and S Straight Flute End Mill

STRAIGHT FLUTE END MILL

Fifteen new two flute, straight flute end mills have been added to the more than 3,200 "standard" tools available from the Cutting Tool Division, Brown and Sharpe Manufacturing Co., Providence 1, Rhode Island.

Four Single-End End Mills from 7/8 inch to 1¼ inches and 11 double-end end mills from ⅛ through 1 inch are the latest additions to the company's line.

All two flute end mills are center cutting and have been engineered for extreme accuracy of plunge cutting and peripheral slotting.

For more data circle 114 on Postpaid Card

★ mms ★

HAND KNOB FIXTURE CLAMPS

Harco Engineering, 12092 Woodbine, Detroit, Mich., has announced the availability of hand knob fixture clamps. The clamps are furnished in a variety of sizes with ¼, 5/16, ⅜, ½ and ⅝ inch studs. Several lengths of

Harco Fixture Clamp

For 2, 3 or 4 spindle drilling you can do it better, faster, at lower cost with U. S. Standard Adjustable Heads.

More reserve stamina built in . . . antifriction bearings . . . high alloy steel spindles and shafts . . . heat treated and shaved gears . . . more than ample spindle bearing . . . parts run in oil (oil-mist for speeds around 4000 rpm).

Standard Adjustable 3-spindle head, all spindles adjustable. Five styles—2 to 4 spindles, up to 1⅜" drill sizes, up to 15" bolt circles.

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US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads. Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

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PACE TAPER ROLLER BEARING
LIVE CENTERS
ACCURACY
± .0001" TIR
RIGIDITY
Preloaded with two Precision Matched Timken or Bower Taper Roller Bearings
for . . . GRINDING • PRECISION TURNING
HEAVY-DUTY OPERATIONS
Write to:
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Universal
"FULL-FLO"
COOLANT NOZZLES
with AERATOR
Ask for IPB-Sec. 2A Bulletin
Quality . . . ALL METAL FLEXIBLE HOSE PRODUCTS
UNIVERSAL METAL HOSE CO.
2113 South Kedzie Avenue, Chicago 23, Illinois

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The "MASTER COMPAR"
INDICATING MICROMETER COMPARATOR
has the VISIBLE feel

No Arguments as to correctness of reading due to "feel".

Use it as Comparator, Master Micrometer, Go & No Go Gage.

1" Range reading in 1/10,000"

To attain permanent accuracy at these close limits, highest precision workmanship and exclusive design of mechanism are of Major Importance and ONLY found in "MASTER COMPAR".

A RIGHT HAND TOOL
Release button for movable Anvils on RIGHT Hand side enables you to hold tool the conventional way.
NEW — Resetting to Zero in 5 seconds
Quick adjustable tolerance hands. Heavy TUNGSTEN CARBIDE Anvils will actually measure Out-of-Roundness, Ovalness and Taper.

0-1" SIZE IN HARDWOOD CASE

$115

Also Available in LARGER SIZES

Ask for Illustrated Circular — Code GIOFF
Sold thru Tool Supply Houses
Ask for Demonstration
GEORGE SCHERR CO., INC. 200-MM LAFAYETTE STREET • NEW YORK 12, N.Y.

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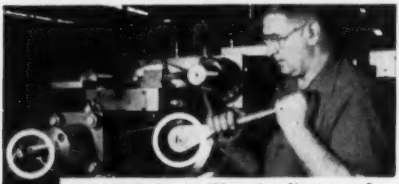


Lowell Series 20 Wrench adjusts stroke length and mold height on Fellows "6-200" injection molding machine.

Durable, fast-action Series 20 wrench has many uses on a Niles 72" Heavy Engine Lathe.

SPEED UP
SET-UP TIME
with LOWELL
REVERSIBLE RATCHET
WRENCHES

A handy and efficient time saver for many shop jobs is this reversible ratchet Series 20 gear wrench.

Its unique feature of ratchet control from the *end* of the handle is a fast-action aid in speeding set-up time. Just a twist of the knurled knob reverses the ratchet . . . and hands are always kept clear of moving parts.

Except for some improvements of internal mechanism and appearance, this is essentially the same Lowell wrench used by machine tool builders for over 50 years!

Gear sizes from ¼" to 2¾", square or hex; handles from 7" to 36" in length.

WRITE FOR BULLETIN MED-1

LOWELL WRENCH CO.
Dept. M-85 Worcester 8, Massachusetts

For more data circle 420 on Postpaid Card

clamp straps are available for each size except the ¼ inch. The clamp straps and studs are hardened high tensile steel for maximum strength and wearability. Hand knobs are cadmium plated, while all other parts have a black oxide finish designed for rust prevention.

For more data circle 115 on Postpaid Card

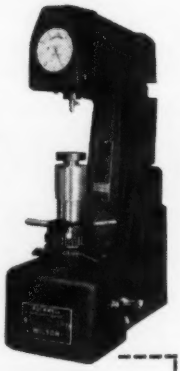
HIGH PRESSURE HYDRAULIC CYLINDER

The Tomkins-Johnson Co., Jackson, Mich., has announced a new concept in hydraulic cylinders. This cylinder is known as the T-J Spacemaker High Pressure Hydraulic with operating pressure of 1,000, 2,000 and 3,000 p.s.i. Featuring the Spacemaker design, the cylinder also offers a hydraulic cylinder cushioned or non-cushioned, forg-

WILSON "ROCKWELL"

THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

A Complete Library of Helpful Information on Hardness Testing



No matter what hardness testing requirements you have, there's a WILSON instrument to do the job for you. WILSON's library of hardness testing information has data on applications—the principles of the "ROCKWELL" tester—operation—accessories—conversion tables—the full line of WILSON instruments.

Write for complete details on specific machines. Just check the bulletins of particular interest to you.

☐ **DH-325**—WILSON "ROCKWELL" Hardness Testers, for *most* hardness testing requirements.

☐ **DH-326**—"ROCKWELL" Superficial Hardness Testers, for extremely shallow indentations.

☐ **DH-327**—Special "ROCKWELL" Testers, for unusual applications, including Automatic and Semi-Automatic models.

☐ **DH-328**—TUKON Tester, for precision MICRO and MACRO testing.

☐ **TT-58**—Twintester, which combines functions of "ROCKWELL" and Superficial Testers.

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ACCO

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AMERICAN CHAIN & CABLE
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For more data circle 421 on Postpaid Card

For fast, economical cutting of flat metal shapes there are

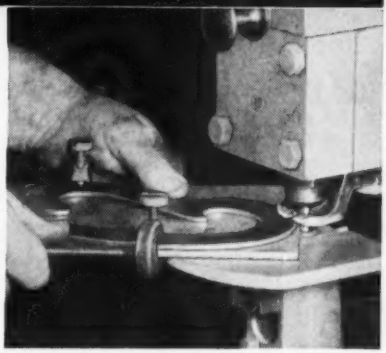
7 MODELS OF Campbell Nibbling Machines

...with cutting capacities ranging from 3/32″ mild steel for **MODEL 0** machine to 1/2″ mild steel for **MODEL 530**, in sheet sizes from 16″ or less, to 72″.

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.



Economical "throw-away" punch and die

• CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

...for any and all kinds of shapes

...for either inside or outside cuts

...with no distortion of material—no internal strains —no invisible fractures—no burr

...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of CAMPBELL NIBBLING MACHINE Capacities

Campbell Nibbler Model #	Sheet Width	WORKING CAPACITY Sheet Thickness Mild Steel	Alloy Steel	Strokes per Minute
0	16″	3/32″	1/16″	900
1A	20″	3/16″	1/8″	375-650
430	60″	3/8″	1/4″	350-525
436	72″	3/8″	1/4″	350-525
530	60″	1/2″	5/16″	350-525
2524	48″	1/4″	3/16″	375-650
2536	72″	1/4″	3/16″	375-650

Send for this catalog for complete information on this versatile production and experimental tool

CAMPBELL NIBBLERS

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Connecticut

ACCO

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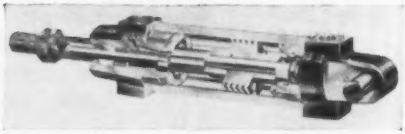


T-J Spacemaker Hydraulic Cylinder

ed steel heads, self-aligning adjustable cushion, high pressure piston ring construction with three types of oversized ports and extra long rod guide bearing—all of which are all standard equipment.

For more data circle 116 on Postpaid Card

★ modern machine shop ★

REPLACEABLE METAL BOWL FILTER

Replaceable metal bowl filters, manufactured by the C. A. Norgren Co., 3425 South Elati St., Englewood, Colo., offer improved filtering efficiency for ¾ and 1 inch air lines where temperatures reach 200 and 300 degrees F., or where pressures go as high as 250 p.s.i. The metal bowl models, furnished with either automatic or manual drain, embody a directional louver which creates a strong centrifugal action for efficient removal of corrosive liquids from the air stream.

Norgren Replaceable Metal Bowl Filter

HARDNESS CONVERSION CHART

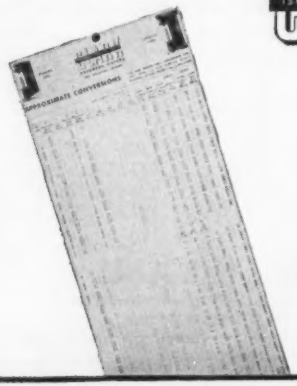
For Every Shop That Does Hardness Testing

This latest and most nearly accurate Hardness Conversion Chart is a necessity wherever hardness testing is done. It has been compiled and produced by CLARK, makers of the internationally respected CLARK Hardness Tester for "Rockwell Testing." Printed on heavy stock convenient for wall mounting, the chart is offered **free of charge** to hardness tester users. Just attach this ad to your letterhead or write "Send wall chart." A copy will be mailed to you without charge or obligation.

P.S. If you would also like information on CLARK Standard and Superficial Hardness Testers, we'll be glad to send that along too.

CLARK

TOMORROW'S ACCURACY TODAY



CLARK INSTRUMENT INC.
10204 Ford Road
Dearborn, Mich.
U.S.A.

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MARK OF QUALITY

STANDARD

TAPER PINS

• The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO.

BEAVER FALLS • PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 424 on Postpaid Card

DORMAN

AUTOMATIC REVERSE TAPPERS

• **Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.**

• **WIDE RANGE TAP CAPACITY.**

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel — 1/2" in Aluminum.

No. 2B POSITIVE TAPPER—capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER—capacity 1/2" to 1 1/4" in Steel—1/2" to 3/4" Pipe Taps.

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

• **PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.**

Priced from **$62.00**

Write for Bulletin

IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc.

1034 NORTH PLUM STREET, LANCASTER, PA.

STANDARD, UNIVERSAL, ADJUSTABLE AND SPECIAL HEAD CENTER DESIGNS

For more data circle 425 on Postpaid Card

HIGHER SPEEDS! FASTER GRINDING!

kipp

AIR GRINDERS

MODEL JA

50,000 R.P.M.

$42.00

IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

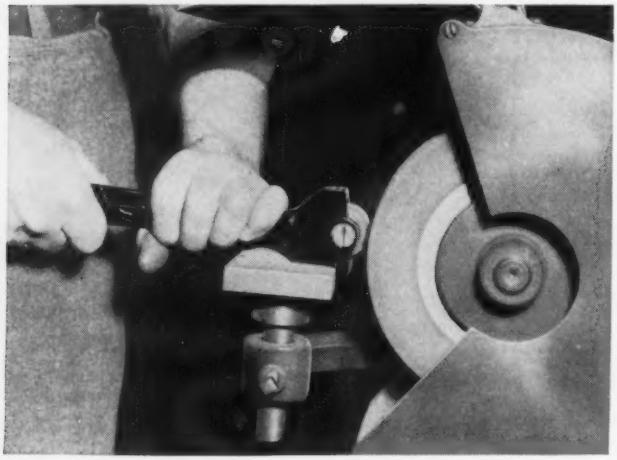
MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U.S.A.

For more data circle 426 on Postpaid Card

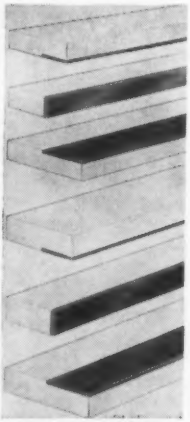
Models with manual drain offer improved filtering efficiency at temperatures up to 300 degrees F. and can be used where pressures reach 250 p.s.i. Automatic drain models handle pressures up to 250 p.s.i. and temperatures up to 200 degrees Fahenheit.

For more data circle 117 on Postpaid Card



COMPOSITE SECTIONS FOR DIES

The Ohio Knife Co., Dept. HH-77, Cincinnati 23, Ohio, has announced that it is making available to companies producing their own dies, six new standard composite sections for use in die construction. These six sections make a total of 17 now available. In addition to O-Kni-Co composite sections now used for cut-off, blanking and forming, these six sections offer many other uses, including applications for draw and pinch trim dies, heels, forming, flanging, back-up plates or as guides and hold down gibs. When used in their virtually endless combinations, these O-Kni-Co composite sections can handle practically



O-Kni-Co Standard Composite Sections for die construction

REGULAR DRESSING LOWERS WHEEL COST

To get greatest production and longest life from each grinding wheel, dress them regularly with Desmond Hex or Huntington dressers. These low cost mechanical dressers remove metal from the pores of a dull wheel—expose sharp new grains for new-wheel efficiency. All Desmond Hex dressers give you six sets of bearings. Ask your Desmond distributor or write for information.

The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

For more data circle 427 on Postpaid Card

MINIATURE
DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths 1/4" to 3"
.0002 Tolerance on I.D.
O.D., and Concentricity
Specials to your specifications
WRITE FOR CATALOG

PREBCO BUSHING CO.
14702 East Arrow Hwy., Baldwin Park, Cal.

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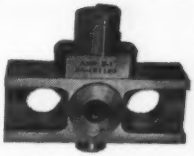
NEW
FLUSH PIN AMPLIFIER

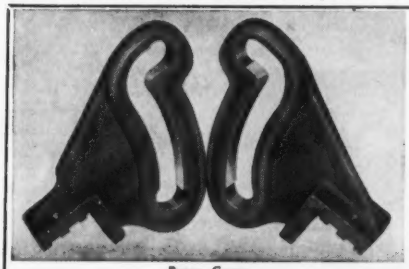


OFFERS 5 to 1 AMPLIFICATION

• No dial indicator needed • No master required • Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.
Columbus 3, Ohio

For more data circle 429 on Postpaid Card



Press Cams

Rowbottom for Cams

Come to "Headquarters" for your needs
All types of cams . . . box, barrel, face, side . . . and hardened and ground, for tough service. Get all the benfits that come from long experience and exclusive service. *Send drawings or specifications.*
Ask for literature on Cam Millers and Grinders.

THE ROWBOTTOM MACHINE CO.
P.O. BOX 4097, WATERBURY, CONNECTICUT

For more data circle 430 on Postpaid Card

TYPES TO FIT ANY MACHINE USED FOR TAPPING OR REAMING

PROMPT DELIVERY

Drive SET-UP COSTS *Down!*

Making set-ups for tapping and reaming can be done with Ziegler Tool Holders at a lower labor cost than with ordinary tool holders for the simple reason that it takes less time with a Ziegler.

Just align the work to within 1/32" of accuracy on the radius (1/16" on the diameter) and the job is done—because the Ziegler Holder automatically compensates for the inaccuracy.

If you have never used a Ziegler, a big surprise awaits you the first time you give it a trial.

W. M. ZIEGLER TOOL CO.
roller drive floating tool-holders
13566 Auburn • Detroit 23, Michigan

For more data circle 431 on Postpaid Card

any die building problem. O-Kni-Co composite sections are carried in stock in lengths or bars up to 125 inches. They are delivered in the lengths specified by the customer, and with the cutting or forming edge already hardened, machined and ground. The soft steel backing, to which specially hardened tool steel (Rockwell 64-66) is bonded, can be quickly drilled for dowel and screw holes. Adjustments for wear are equally simple.

For more data circle 118 on Postpaid Card

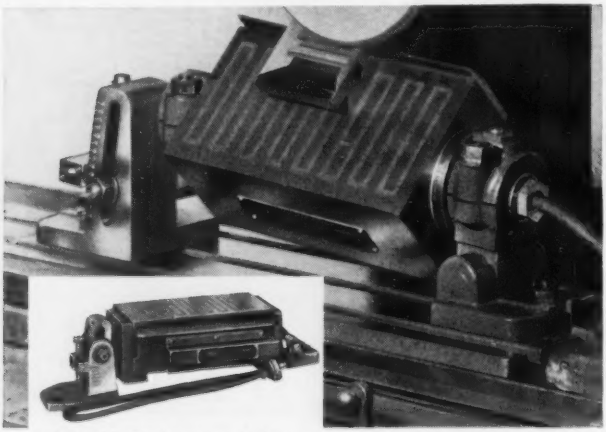
★ modern machine shop ★

SHELF FILING UNIT

Equipto, 606 Prairie Ave., Aurora, Ill., is now offering a shelf filing unit which has been designed to save space and clerical time. It holds 21 feet of files (over nine standard drawers full) in only 3 square feet of floor space, yet permits instant accessibility to each file. Each unit is 3 feet wide, 12 inches deep and 7 feet 3 inches high.

Infinitely adjustable spring steel follower rods hold files neatly under compression. All shelves are equipped with full length label holders.

For more data circle 119 on Postpaid Card



Adjustable Chucks are available as Duplex, Taper Base or Swivel Base, in work surface sizes from 4" x 8" to 10¼" x 60".

See how easy it is to set up a formed cutting tool on a Taft-Peirce Duplex Base Chuck to grind a compound angle.

Taft-Peirce Adjustable Chucks Save Setup Time, Make Angle Grinding Easy

Speed, precision and simplicity go hand-in-hand when you use Taft-Peirce Adjustable Chucks for tough angular setups.

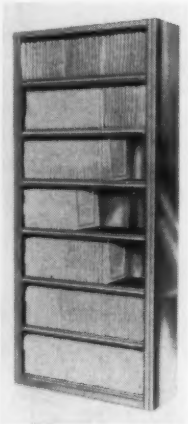
Superpower Duplex Chucks are a real time saver for grinding simple or compound angles, milling and grinding formed cutting tools, and dressing carbide tipped or steel single point tools. Swivels to 90 degrees either side of horizontal, tilts to 14 degrees, clamps rigidly at any setting.

Complete line of Magnetic Chucks from one source — Taft-Peirce. These are but a few of the great variety of standard and special chucks — both permanent and electro-magnetic — which you can get from Taft-Peirce. Send for Catalog 412, and try one of these in your shop, now.

TAKE IT TO TAFT-PEIRCE

WOONSOCKET, RHODE ISLAND

For more data circle 520 on Postpaid Card



Equipto Filing Unit

Expedite Mold-Making with CERRO* ALLOYS

Low-temperature-melting CERRO ALLOYS are excellent for rapid, accurate, inexpensive production of molds. A typical example is the Polyethylene bottle mold of which one-half is shown above. Patterns, secured to a metal plate, are sprayed with molten CERRO ALLOY to a depth of 1/16", then removed and incorporated in a chase. A copper tube for rapid water cooling is included in the mold. Thousands of bottles were produced from this mold. For detailed information send for Bulletin G2.

CDeP®

CERRO DE PASCO SALES CORPORATION

304 PARK AVENUE, NEW YORK 22, N. Y.

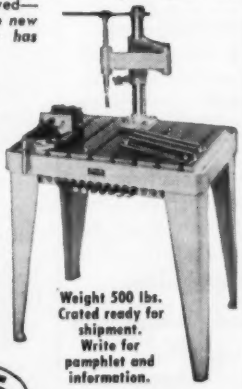
*T.M. Cerro de Pasco Corporation.

For more data circle 432 on Postpaid Card

Try this Allman Universal Hand Tapper FREE for 15 days—

Results have proved that once this tapper is in your shop or tool-room and you find 70% of your free hand tapping time saved—it will stay there! *The new Allman hand tapper has these advantages:*

- Articulate arm swings clear of large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vise holds work as small as 3/8" square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds.



Weight 500 lbs. Crated ready for shipment. Write for pamphlet and information.

TOOLS, INC.

1734 No. 25th Ave. • Melrose Park, Ill.

For more data circle 433 on Postpaid Card

SPECIFY TOP QUALITY

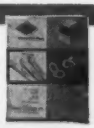
DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from 1/8" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, 1/2" x 25' coils packaged in transparent plastic boxes, except above .020". Strips 1/2" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001 to .032".

WRITE FOR DE-STA-CO Illustrated Brochure and Price List!

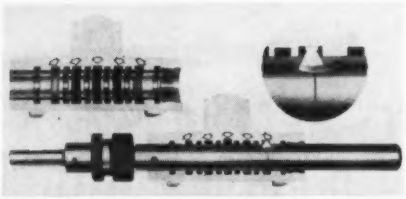


DETROIT STAMPING CO.

349 MIDLAND AVE., DETROIT 3, MICHIGAN

For more data circle 434 on Postpaid Card

METHOD FOR DEBURRING AND CHAMFERING INTERNAL ANNULAR GROOVES



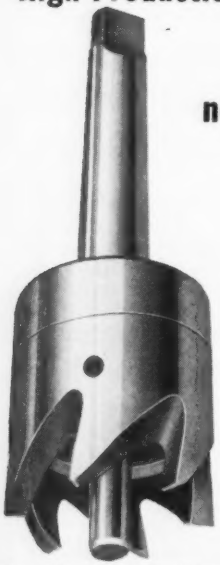
Standard Nobur AHA Tool for deburring and chamfering internal annular grooves

Adaptation of the standard Nobur HA Tool to such unusual and restrictive applications as the controlled deburring and chamfering of internal annular grooves about a central bore of not less than 3/16 inch in diameter has been announced by Nobur Manufacturing Co., 6860 Farmdale, North Hollywood, Calif. Such requirements are extensively associated with the manufacture of hydraulic components as used in many industries and more recently in the production of rockets, missiles and so on.

The AHA Tool features an angulated cutter which can be mechanically projected from and retracted into a long cylindrical pilot by the operator's movement of a knurled sleeve. It is securely locked when in a projected position. For application to an internal groove, the cutting blade is formed with an integral non-cutting guide extending beyond the cutting surface. This is ground narrower than the

High-Production, Close-Tolerance HOLES in ONE PASS!

new Clark HOLE-MILL



One arbor accommodates several HOLE-MILL sizes.

Designed for high-speed production of close-tolerance, fixed-diameter holes, the smallest Clark HOLE-MILL cuts stock up to 1" thick. Completes holes from one side in a single pass—without clearing chips! Piloted action makes accurate starts on cylindrical, flat or crowned surfaces. Pilot can be replaced with stub drill.

Uses new M3-type high-speed steel... takes heavy cuts on all materials including alloy steels and permits use of automatic feeds on machines. Can also be used on heavy-duty portable drills. HOLE-MILL sizes from 1" to 4" by fractions, decimal sizes on order. Shanks furnished straight or with Morse tapers, other tapers available. Write for circular and prices! Ask for Clark HOLE-MILL—made by **specialists in Hole-Making Tools!**

HOLE-MILLS smaller than 1" or larger than 4" supplied on special order. Write detailing your needs.

Robert H. Clark Company

9330 Santa Monica Blvd.
Beverly Hills, California

For more data circle 435 on Postpaid Card

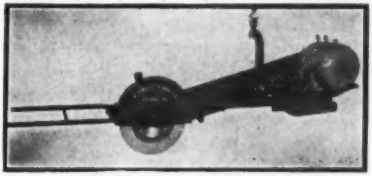
- **PIERCING PUNCHES**
- **BUTTON DIES**
- **STANDARDS · SPECIALS**

Also send Blue Prints for Estimates on screw machine products and centerless grinding.

PEMCO PERFORATORS CO.
DIVISION
PORTER MACHINE CO.
CINCINNATI 9 OHIO

For more data circle 436 on Postpaid Card

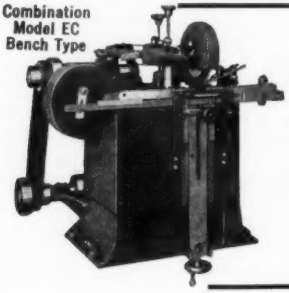
MUMMERT-DIXON SWING FRAME GRINDERS
Sizes 12", 14", 16", 18", 20" and 24" wheels



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.

For more data circle 437 on Postpaid Card

Combination Model EC Bench Type



SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING
HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information

THE WARDWELL MFG. CO.
3803 RIDGE ROAD • CLEVELAND 9, OHIO

For more data circle 438 on Postpaid Card

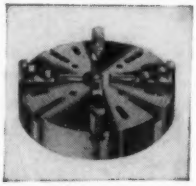
B.S.A. CHUCKS MEDIUM DUTY • PRECISION MADE IN ENGLAND

MODEL 580
Self - centering Geared Scroll UNIVERSAL • Three Jaws

Includes 1 set External Jaws, 1 Key, 1 set Internal Jaws, 3 Pinions, 3 Bolts.

IMMEDIATE DELIVERY

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
3"	3½	⅝"	$ 35.75
4"	8	1"	35.75
5"	12	1¼"	41.50
6"	17½	1⅝"	48.00
7½"	29	2"	56.50
9"	42	2½"	71.50
10½"	62	3"	88.50
12"	88	3"	120.00
15"	143	3¼"	180.00
18"	200	4"	261.00
21"	262	4½"	320.00
24"	324	4½"	390.00



MODEL 550
4-JAW INDEPENDENT CHUCK

Includes 4 operating screws, 4 Reversible Jaws, 4 Bolts, 1 Key.

Order Today

SIZE	WEIGHT (lbs.)	CHUCK BORE	PRICE
4½"	8	1"	$ 30.50
6"	16	1⅝"	35.00
8"	34	1¾"	51.00
10"	60	2"	62.50
12"	80	2¾"	74.50
14"	98	3"	84.00
16"	126	3"	105.00
18"	166	4"	140.00
20"	204	4"	165.00
22"	246	5"	205.00
24"	322	5"	220.00
30"	490	5½"	340.00

Dept. B, 251 Centre St.
NEW YORK 13, N. Y. CAnal 6-5575

VICTOR MACHINERY EXCHANGE, INC.
Dealers in Tool Room Equipment

For more data circle 439 on Postpaid Card

groove, so that the guide will readily enter the groove followed by the cutter which imparts its particular form to the workpiece.

All Nobur tools have been designed for use in a lathe, drill press or hand drill. Standard diameter of pilots ranges from 3/16 to 1 inch.

For more data circle 120 on Postpaid Card

OSCILLATING 10 INCH DUPLEX GRINDER

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., recently announced its Model SCE-10 Duplex Oscillator which provides another step forward in carbide tool grinding. With it, production carbide tool grinding is brought to the maximum of speed and the minimum of operator fatigue and operating time.

The manufacturer claims that one operator can grind two tools at once with less effort and in less time than is required for partially grinding one tool by conventional methods.

The SCE-10 Wheel Oscillation has two variables, both controlled by handwheels. One is the stroke length from 0 to 1½ inches for up to 2 inch tools. The other variable is the stroke frequency that ranges from 0 to 115 per minute.

The SCE-10 Duplex Oscillator carries a 10 inch diameter diamond wheel. The spindle construction has been designed for heavy duty and smooth operation with large preloaded duplex bearings, dynamic balancing and

FIRST for secondary finishing...

SCHAUER SPEED LATHES

Filing cast iron flange with variable speed type VA3CCA Schauer Speed Lathe.

Schauer Speed Lathes provide the most economical method for performing secondary finishing work on metal and plastic parts. Do filing, trimming, deburring, lapping, polishing, etc., faster, at lower costs on Schauer Speed Lathes. Many sizes and models with holding devices to suit the job. *Speed your production* with Schauer Speed Lathes. Write for Catalog No. 530.

OUR 50th YEAR

SCHAUER MANUFACTURING CORP.

4501 Alpine Ave. • Cincinnati 42, Ohio

For more data circle 440 on Postpaid Card

Helps you achieve *sound design* and *production economy* . . .

ASME HANDBOOK METALS ENGINEERING —PROCESSES

JUST PUBLISHED IN THIS HANDBOOK YOU will find detailed data on the various processes by which metals are converted into finished products. Composed of a wealth of practical, day-to-day engineering helps; covers such areas as: the heat treatment of steel, all forms of casting, hot and cold working, powder metallurgy, welding, machining, and electroforming. For each of the manufacturing methods gives a compilation of the basic physical characteristics to be considered, and general advantages and limitations usually encountered. Edited by **Roger W. Bolz**, Editor, *Automation*. **423 pages, 7 x 10, 512 illus., $13.50.**

Send money order or check to:

Book Editor
MODERN MACHINE SHOP
431 Main St. • Cincinnati 2, Ohio

6" Universal Dividing Head with DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

Write for Catalog

CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave. • Cincinnati, Ohio

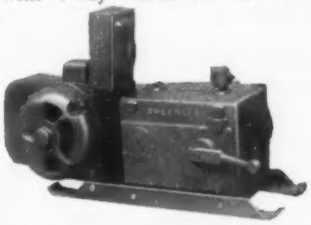
For more data circle 441 on Postpaid Card

PORTABLE PUMP

for hydraulic rams, jacks, presses, fixtures, etc.

WITH EXCLUSIVE RAPID APPROACH SINGLE- OR TWO-WAY ACTION

No. 798-AC-5A delivers 28 cu in. per min at 10,000 psi Easily carried hydraulic pump . . . fast, simple setup to operate a wide variety of hydraulic units. Rapid approach with automatic changeover to high-speed, and high-power drive are exclusive features. Develops 6,000 psi continuous, 10,000 psi intermittent pressure. 115-230-v, ¾ hp, a-c motor. Available with 4-way valves for double-acting rams.



No. 797 — up to 213 cu in. per min at 10,000 psi Extra-high-speed drive at high pressure. Applies to a wide range of hydraulic systems. Develops 6,000 psi continuous and 10,000 psi intermittent pressure. Delivers 106 cu in. per min of oil at 10,000 psi with 2 hp a-c motor — 213 cu in. with 3 hp motor. Three-phase, 60-cycle, 220/440-v motors. Available with 4-way valves for double-acting rams.

TOOLS FOR CRAFTSMEN
GREENLEE

GREENLEE TOOL CO.
1988 Herbert Avenue, Rockford, Ill.

For more data circle 442 on Postpaid Card

precision fitting. The spindle nose is tapered for true wheel flange and wheel mounting. The spindle oscillates on tapered roller bearings and, for electrolytic operation, it is insulated from the machine and is equipped with a 600 ampere capacity power pickup.

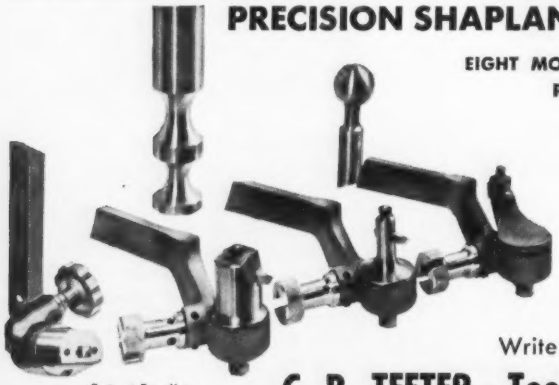
The machine has two tables mounted on ball bearing ways which are arranged so that grinding can be done on both sides of the diamond wheel at the same time. Also, one table can be loaded while the other is in the grinding position.

Hammond Model SCE-10 Duplex Oscillator

Angular setting with handwheels ranges from 10 above to 25 degrees below horizontal with no movement of

GRIND THE
Eastern Centerless Way
WE SPECIALIZE
20 CENTERLESS GRINDERS
ESTABLISHED 1939
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.
For more data circle 443 on Postpaid Card

PRECISION SHAPLANE RADIUS TOOLS



EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS

Range: 3/8" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

Write for circular

Patent Pending

C. B. TEETER - Tool Room Specialties
1221 W. Addison St., Chicago 13, Illinois • Phone DRexel 3-3571
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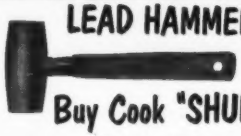
LEAD HAMMERS—



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. . . for most lathes to 1" bar stock cap.

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A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2", by 1/64"—plus handy 17/32" size. Length 4 7/8". ONLY $17.90.

Single sizes available

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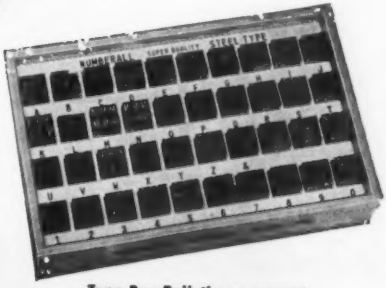
STEEL TYPE

TYPE AND TYPE BOX

Indexed Sectional Type Box with separate compartment for each character. Two sizes for small and large type.

Hand or Press Style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to 1/2" figures and letters. Write for Bulletin MS23H.



NUMBERALL STAMP & TOOL CO.

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Type Box Bulletin on request.

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the tables toward the wheel. Each table has replaceable wear plates and an area of 10½ by 15½ inches, including the sliding wings. The wings support offset tools and push out of the way in case the wheel stroke should be increased. A guard on each side of the wheel can be removed for offset grinding.

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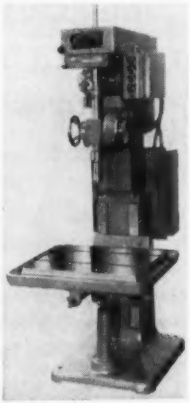
VERTICAL GUN TYPE DRILLING MACHINE

A vertical gun type drilling machine, the Model 2G, has been developed by Edlund Machinery Co., 32 Huntington St., Cortland, N. Y., to meet the demand for an economical machine for producing the ultimate in extremely straight, accurate and smooth holes at production rates in one operation.

According to the manufacturer, deep holes that formerly required withdrawal of the tool can now be drilled with continuous feed, and materials that ordinarily work-harden during machining can be drilled with ease.

The machine is of the vertical spindle type, which lends itself to multiple spindle operations, where one opera-



Edlund Model 2G Gun Drilling Machine

EVERY TIME YOU MOVE A MACHINE

Barry Machine Mounts CUT MAN-HOURS 90%

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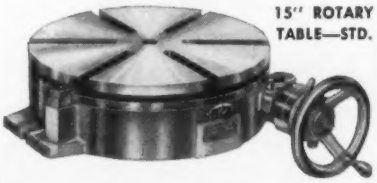

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Get This Production Boosting

"TRICO-MIST" COOLANT SYSTEM

With Flexible Armored Coolant Lines And Kwik-Change Nozzle

For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

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new shop equipment . . .

tor can use several spindles by loading one while the others are working. Also, one gun drilling spindle can be combined with standard drilling spindles on a common base so that operations requiring one gun drilled hole and one or more regular holes can be performed at the same time. Odd shaped pieces, which cannot be rotated, can be drilled with the Edlund Model 2G as the gun type drill itself rotates.

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★ modern machine shop ★

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Larger Working Surface: 48" x 11⅝" ● *Longer Travels:* 30" L., 10" X. & 16" V. ● *Faster Operation:* RAPID Traverses in all directions ● *Complete Safeguards:* Overload Feed Clutches etc. ● *Up-to-date Construction:* Built-in Backlash Eliminator, 4-Bearing (Timken) Spindle etc. ● *Wider Ranges:* Feeds: .65"-21.5" min., Speeds: 30-1500 RPM (2 ranges)

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151

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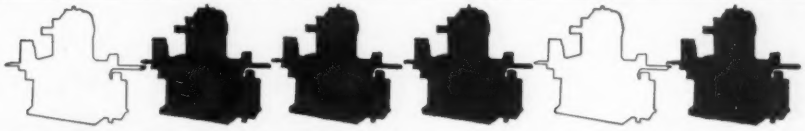
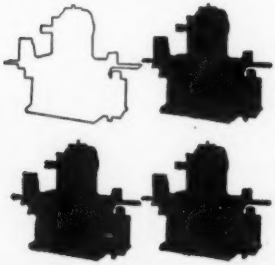


SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS . . .



— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

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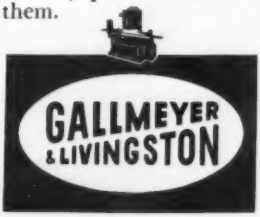
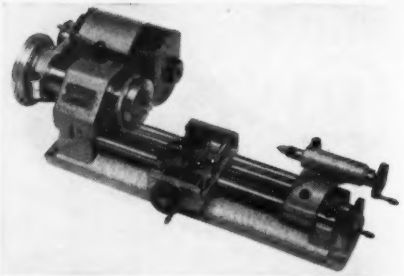


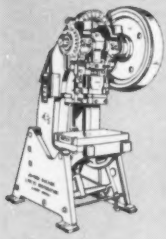
GALLMEYER & LIVINGSTON CO.
408 Straight Ave., S.W. Grand Rapids, Michigan

13, N. Y., has announced the availability of its Unimat, which is a precision tool designed for engineers and model makers. It is a combination of ten tools in one, operating on just one base. It is ideal for machining small parts made of steel, brass, aluminum, wood or plastics.

Simple to operate, the Unimat Basic Unit can be set up as a lathe, drill



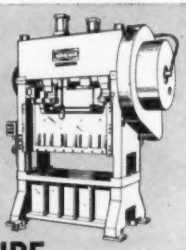
Unimat Machining Unit for small parts



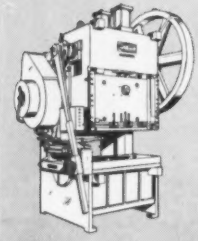
13 models from 16 to 150 ton

INCLINABLE

Single and Double Crank from 40 ton to 200 ton



STRAIGHT SIDE

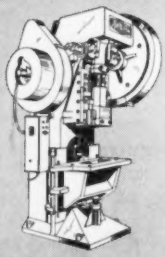


GAP

60 ton to 200 ton

HORN

60 ton model in flywheel and back geared type



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Write for Bulletin 1958

Johnson POWER PRESSES

JOHNSON MACHINE & PRESS CORP.

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press, milling machine, tool grinder, polisher or hand drill. The basic unit also includes motor, lathe, drill chuck and other lathe accessories. Attachments available include jig saw, table saw, threading attachment, indexing and dividing attachment and many others.

For more data circle 123 on Postpaid Card

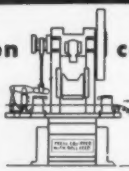
ENGRAVING CUTTERS ARE AVAILABLE IN HIGH SPEED STEEL AND CARBIDE

H. P. Preis Engraving Machine Co., 249 Industrial Branch, U. S. Highway 22, Hillside, N. J., has announced a complete line of improved engraving cutters both in high speed steel and tungsten carbide.

These taper shank cutters are made from fine grade high speed steel in the four standard styles, without the flange and wrench flats. The blanks are heat treated to Rockwell C 64-66 and then ground from the solid, assuring better and more uniform hardness throughout the cutter. Flats on all cutters are ground within 0.001 inch above center and tapers are held accurate to 0.0002 inch in order to assure a perfect fit into the cutter spindle.

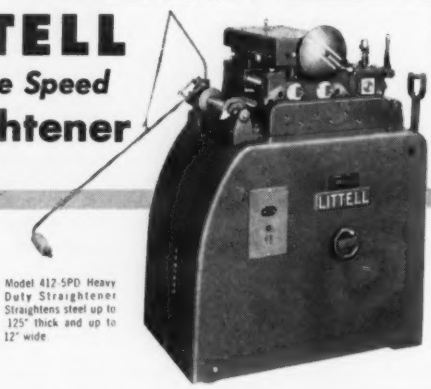
Tungsten carbide tipped cutters are available in three sizes with brazed tips up to ⅜ inch wide and two styles with adjustable tungsten carbide blades designed for taking extra wide cuts.

A full line of straight shank, single lip high

straighten  coil stock as you feed it

with a

LITTELL
Variable Speed
Straightener



Model 412-5PD Heavy Duty Straightener Straightens steel up to .125" thick and up to 12" wide

A Littell straightener removes the curvature from coil stock. The press, slitter or shear receives a continuous strip of pre-straightened stock. Equipped with variable speed transmissions, Littell Straighteners are adjustable to meet a wide range of speed requirements in automatic feeding. They also simplify hand feeding. A variety of medium and heavy duty models straighten coil stock of all standard widths and thickness.

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Speed with Safety

ROLL FEEDS • COIL CRADLES
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NEW 1958 CATALOG

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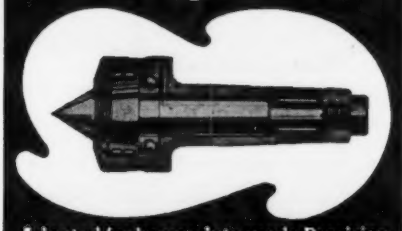

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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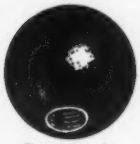
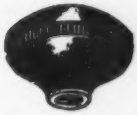


Round Plastic

Oval Plastic

Round Steel



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speed steel cutters up to 5/16 inch in diameter and solid tungsten carbide cutters up to ¼ inch in diameter is available from stock in various lengths designed to fit most engraving and vertical high speed milling machines.

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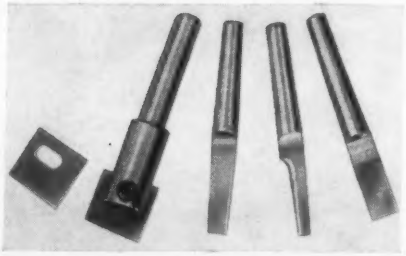
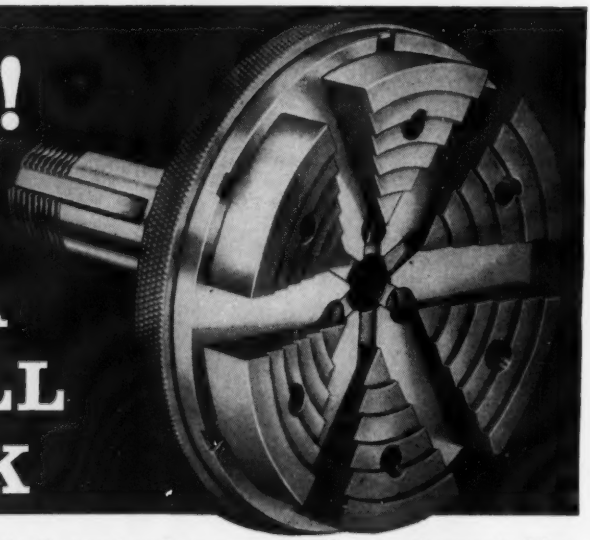


Preis Taper Shank Engraving Cutters

New!

ALINA SCROLL CHUCK



A truly high precision chuck developed to meet exacting requirements. The method of clamping the largest possible area of the circumference permits minimum use of pressure; fragile work is never deformed or crushed. In order to maintain this advantage chucks over 4″ capacity are equipped with eight jaws.

Removable jaws are available in a wide variety of styles for internal or external chucking, or they may be had in blank form suitable for your own machining.

Simple design permits quick and easy replacement of the shank, and shanks to suit special requirements may be machined at minimum cost in any shop.

Six sizes from 2″ to 6″ to fit all machines. Furnished with or without shanks.

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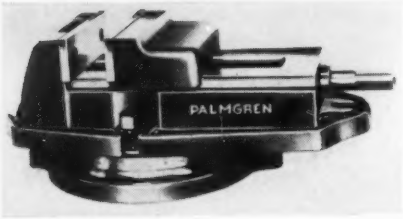
new shop equipment . . .

FLANGED MILLING MACHINE VISE WITH SWIVEL BASE

Chicago Tool and Engineering Co., 8399 South Chicago Ave., Chicago 17, Ill., recently announced the addition of a new model to the Palmgren Line of machine vises. The Palmgren No. 80B Flanged Milling Machine Vise with swivel base has been precision built and constructed for heavy duty service for use on millers, shapers, planers, drill presses, radial drills and grinders.



Palmgren No. 80B Milling Machine Vise with removable ground steel jaw plates

The No. 80B Vise is provided with flanges for clamping down to the machine table and may be used with or without the 360 degree graduated swivel base. The swivel base is equipped with two bolt lugs for clamping to the machine, and is also furnished with two 11/16 inch keys and screws to fit machine table slots.

The vise has jaws 8 inches wide, opens 8 inches and has a jaw depth of 2½ inches.

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with large die area capacities up to 400 tons

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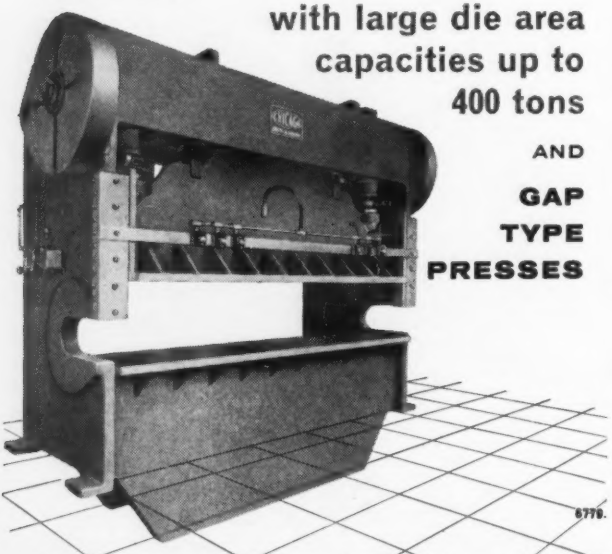

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Press Brakes • Straight-Side-Type Presses • Press Brake Dies

Hand and Power Bending Brakes • Special Metal-Forming Machines

DREIS & KRUMP MANUFACTURING CO.

7418 South Loomis Boulevard, Chicago 36, Illinois

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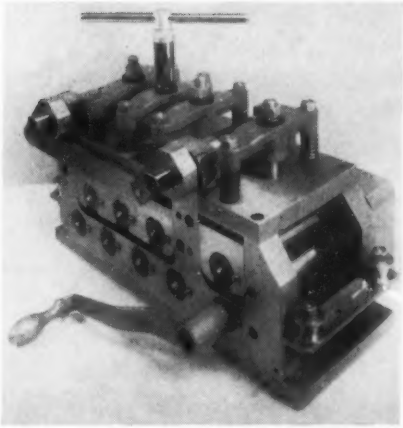
STOCK STRAIGHTENER

Durant Tool Supply Co., Providence 3, R. I., has announced a heavy duty stock straightener that takes light or heavy stock up to ¼ inch thick and 4 inches wide. It may be adapted to special widths up to 10 inches. The design of this unit enables the entering and starting of new stock coils through the straightening run without the necessity of resetting the rolls or losing the original required stock thickness setting. A simple one half turn of the control crank releases the top three straightening rolls all at one time, while the four bottom rolls maintain alignment. After the stock is entered into the unit, it is possible to reset the same straightening pressure by a one half down turn of the control crank.

Furthermore, this straightener features two entrance rollers, independent of the straightening rolls, which are crank controlled. These adjustable guide entry rolls and the seven pressure rolls are all roller bearing mounted for maximum efficiency.



Durant Heavy Duty Stock Straightener

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the **ARC-TWIN** *Cuts Two Perfect Notches*

in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅜" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

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Ask for twin-notched sample of pipe or tubing

VOGEL TOOL AND DIE CORPORATION 1823 North 32nd Avenue Melrose Park, Illinois

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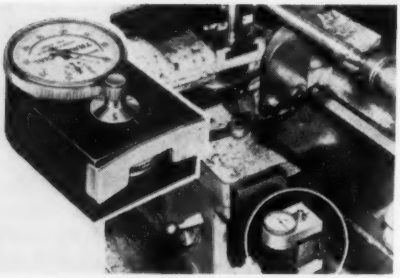
new shop equipment . . .

MEASURING INDICATOR FEATURES INFINITE TRAVEL

M. E. Hodge Corp., 35 North Raymond Ave., Pasadena 1, Calif., has introduced a new indicator, for use with any machine tool, that measures complete longitudinal travel of the machine, as well as transverse and vertical travel on certain tools. Known as the Trav-A-Dial, the instrument reads any length in 6 inch increments, furnishing a visual record in inches, hundredths and thousandths on its large, easy to read dial. No plungers are used and no measuring rods or other devices are required. Traverse is totalled on the indicator by accurately recording revolutions of a slip proof wheel, which contacts the way of a lathe or any smooth surface of other tools. This instrument is accurate within 0.001 inch in 6 inches of travel and repeats unfailingly, it is claimed.



Hodge Trav-A-Dial Measuring Indicator

On lathes, the Trav-A-Dial enables the operator to pick up all lineal measurements without us-

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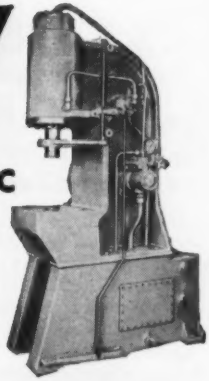

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ing stops of any kind or resorting to other measuring means. It is ideal for boring blind holes, turning shoulders or grooves to exact tolerance and spacing, and in making setups. Trav-A-Dial eliminates errors on mills, resulting from worn lead screws, backlash or changes in table position as a result of locking the slides. Other applications include drilling or boring to location or depth on radial drills and boring machines, picking up lineal dimensions on AN cutters and form tools on tool and cutter grinders, step grinding on surface grinders and so on.

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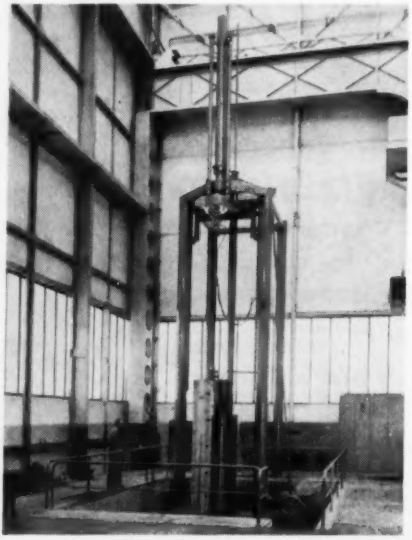
GIGANTIC VERTICAL HONING MACHINE

The C. Allen Fulmer Co., Dept. S, 107 East Fourth St., Cincinnati 2,



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ABRASIVE CENT-R-LAP TOOL

Saves time, eliminates diamond dressing. Cones changed in seconds. Available in three sizes: ⅜", ¾" and 1½". Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices. Sold to consumers only.

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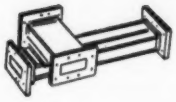

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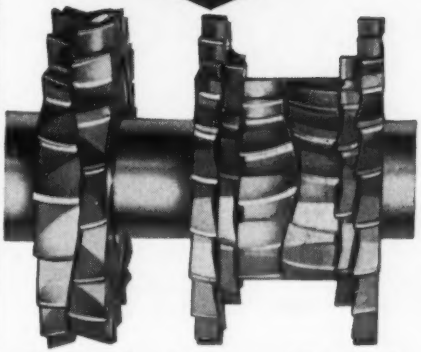
ABER Curved Tooth MULTIPLE CUTTERS



By using the wide range of Standard ABER CUTTERS for gang milling . . . fast accurate cuts on any number of surfaces simultaneously.

ABER Engineering service will design and make the unit exactly suited to your job . . . send blueprints and specify material to be cut.

ABER *Curved Tooth* PLUS FEATURES

1. Longer production runs
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3. Elimination of chatter
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24 page catalog on milling with ABER Cutters.

ABER ENGINEERING WORKS
WATERFORD WISCONSIN

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Ohio, recently delivered what is claimed to be the largest vertical honing machine in the world to a customer in Europe.

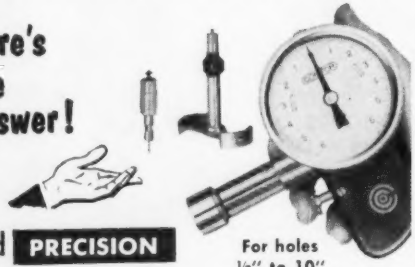
This machine, the Fulmer Special Model 30/144, which is 44 feet tall (the equivalent of a five story building) features a stroke of 144 inches and a diameter capacity of 30 inches. The work table can accept work weighing up to 80,000 pounds and has an in and out travel of 72 inches to permit an overhead crane to drop heavy work directly onto the table. This honing machine has a swing of 96 inches.

An oversize coolant system includes a 450 gallon reservoir with an automatic recirculating filter to provide maximum efficiency in coolant operation. Coolant volumes of over 30 g.p.m. can be delivered to the work and the large volume of coolant in the reservoir is said to insure efficient honing without the use of a coolant refrigerator.

Reciprocation of the honing machine spindle, and thus the honing tools, is by means by twin hydraulic cylinders, using the company's hydraulic counterbalance circuit, with reciprocating speeds adjustable by the operator from zero to 70 f.p.m. A 25 h.p. motor powers the main hydraulic reciprocation system, with a separate 3 h.p. motor to operate the auxiliary hydraulic systems. Spindle rotation is by means of a 40 h.p. motor through proper gear reduction, so that the

For gaging close-tolerance holes

Here's the answer!



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For holes 1/8" to 10" diameter

TREMENDOUS ECONOMY

—a very modest cost puts it to work . . . no training program, no wires, air hose or electronics.

Unique construction gives positive 2-point gaging. Detects tapers, ovality, bell mouth. Shows ACTUAL SIZE. Fixed, not passing, reading. Special plugs gage shoulders, splines, recesses, spherical holes, etc.

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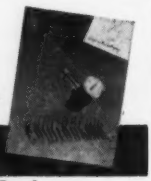
COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.



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NO SHORTENING! NO DISTORTION!

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Fast Installation— Just Drill and Tap.

Guaranteed for Life Against Breakage.

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LOWEST PRICES

Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

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★ These diamonds can be set in any shank to your specification for $1.00 each extra.

★ Prompt resetting service

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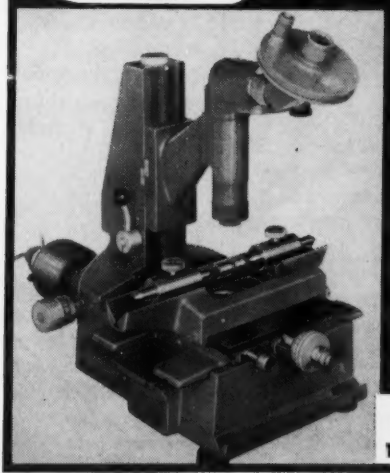

- Permits measurements in 2 dimensions plus checking of Radii, Concentric Circles, threads and angles.
- Has exclusive intermediate image system which combines coordinate measuring microscope and optical comparator in one instrument.
- Built-in charts permit use in three magnifications.
- Reads to .0001" or to .00005" from Master glass scales in larger models.
- Available in 1" x 2", 1" x 4", 2.3" x 6", 6" x 6" and 8" x 40" capacity.

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operator can select any one of eight spindle rotation speeds from 11 to 108 revolutions per minute.

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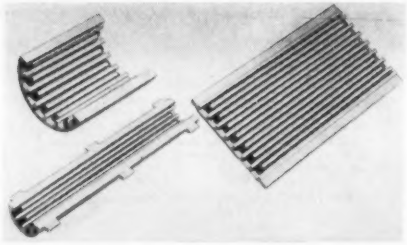
★ modern machine shop ★

ELECTRIC HEATING UNIT

Hevi-Duty Electric Co., Milwaukee 1, Wis., has announced a complete line of flat and semi - cylindrical electric heating units in many sizes and two temperature ranges—1,800 and 2,200 degrees Fahrenheit maximum.



Hevi-Duty Electrical Heating Units

Flat units may be used as a flat heating surface or may be grouped together to form an enclosed heating chamber. The refractories are shaped so that the electric coils may be either exposed or muffled.

Semi-cylindrical units are ideal for heating straight lengths of pipe or tubing. They can be arranged to completely surround a pipe or to merely apply heat under a curved surface. These units are available in 29 standard sizes.

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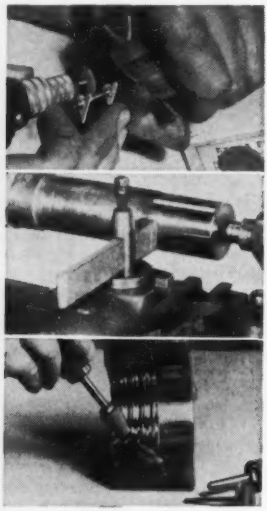
WHEELS · POINTS · BLOCKS STICKS · CONES for power or manual application and dimensional control. **CRATEX** is sold through leading industrial supply distributors.



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☐ Stainless Steel
☐ Aluminum
☐ Brass & Bronze
☐ Cast Iron
☐ Heat-treated Steel
☐ Special Alloys

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AUTOMATIC DIE STOP

Rob-Bilt Products, Post Office Box 55163-M, Indianapolis, Ind., has announced the availability of automatic die stops, which are guaranteed for life against breakage. These die stops can be used at any angle for practically all types of dies and, also, right and left hand feeds, side gages, angle gages and end gages. The stop can be installed without filing or milling, with the performance of only a few simple tapping and drilling operations.

Rob-Bilt Automatic Die Stop is shown above

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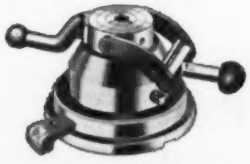
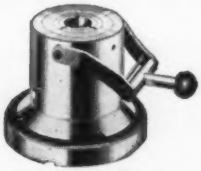
GET A HOLD ON YOUR WORK



Holding-indexing fixture



Holding fixture

Vertical-horizontal fixture

USE ZAGAR COLLET FIXTURES

Successful and profit-making for over 15 years, Zagar holding and indexing fixtures step up production and cut your costs. They are *effective* because they hold work rigidly, firmly. They are *economical* because first cost is low, and much costly special tooling can be eliminated. They are *efficient* because set-up is speeded and small part production is a natural. Slot mill, straddle mill, drill, tap, and grind small pieces simply, quickly, and profitably with one of many Zagar collet fixtures—available from stock.

Write for Engineering Data Sheets "S-8".

Zagar

ZAGAR, INCORPORATED
23898 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

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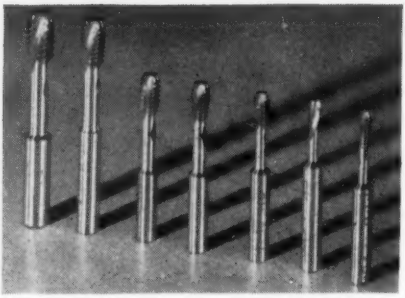
STUB TAPS FOR SCREW MACHINES

Jarvis Corp., Middletown, Conn., has announced a spiral flute stub tap, designed to solve problems frequently encountered when using standard taps in screw machines. The manufacturer claims that the spiral flute stub tap has excellent shearing action and superior chip "ride-out." In addition to spiral fluting, the section immediately behind the threads is necked down to below the root diameter. This necking provides more chip room, reduces drag and facilitates application of cutting oil or coolant to the cutting edges. These advantages all contribute to accurate tapping and long tap life.



Jarvis Stub Taps for screw machines

These stub taps are extremely strong because of their very short threaded section and short overall length. Shanks are ground to standard fractional dimensions. They permit the use of standard size bushings and eliminate the need for special types of drills or reamers when making tap holders.

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Modern Machine Shop

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MODERN MACHINE SHOP

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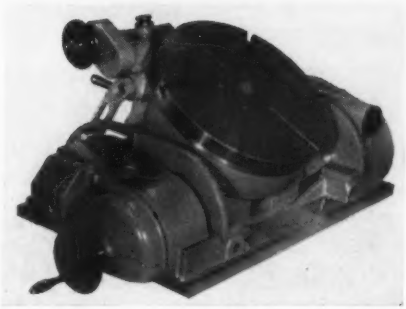
OPTICAL AND INCLINABLE ROTARY TABLES AVAILABLE IN 12 AND 16 INCH SIZES

Responding to numerous requests from precision engineers for means of producing and checking compound angles with an ever increasing degree of accuracy, Bentley Industrial Corp., 41 East 42nd St., Dept. E-8, New York 17, N. Y., has introduced a fully optical 12 and 16 inch rotary and inclinable table. The table employs photo-edged lines in conjunction with optical wedge prisms; that is, a fully optical system that is completely free from wear.

The table incorporates a locking device, whereby a clamp is depressed, which straddles a number of lapped pins inserted in reamed holes in the worm wheel. This method is claimed to assure complete freedom from deflection even when heavy and eccentric loads are mounted.



Optical and Inclinable Rotary Table

The optical scales are read direct to one second of arc, and two eyepieces are furnished for the rotary scale to facilitate its reading throughout the axis of inclination.

For more data circle 132 on Postpaid Card

People work better when they SEE BETTER®

Leeds & Northrup Company uses the MAGNI-FOCUSER — the needle sharp 3-D binocular magnifier — to inspect carbon detectors for micro-carb control of carburizing. The MAGNI-FOCUSER reduces eye strain and avoids squinting. It leaves both hands free to work. This means increased production, greater accuracy, fewer errors and accidents. Scores of industrial jobs are aided by the MAGNI-FOCUSER. It's light weight; can be worn with or without eye glasses. Normal vision resumed simply by raising the head. Speed your production by ordering now on 10-day trial basis without obligation. $10.50. Or send for illustrated folder.

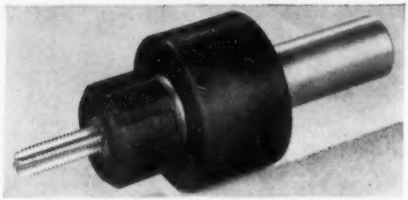
MAGNI-FOCUSER the 3-D Magnifier that speeds production and leaves both hands free to work

EDROY PRODUCTS CO., Dept. P, 480 Lexington Ave., New York, N. Y.

For more data circle 489 on Postpaid Card

RELEASING TAP CHUCK DESIGNED FOR LONG WEAR

Universal Engineering Co., Frankenmuth, Mich., has developed its Universal Releasing Tap Chuck, which embodies the same basic collet principle featured in all of the company's collet chucks. Screws or sleeves are not needed and the collets are quickly and easily interchangeable with all other types of universal chucks.



Shown above, Universal Releasing Tap Chuck

These releasing tap chucks have been designed for simplicity and compactness without springs, cams or pawls which tend to break and wear out. This particular type of chuck can be used for either right or left hand tapping operations without any chuck adjustment whatsoever.

The company has also announced its Universal Thread Die Holder which works on the same self-releasing principle as the releasing tap chuck. It is equipped with a Standard Acorn Die Holder for accommodation of precision U.S.S. Acorn Dies, and is adjustable for the correct pitch diameter.

For more data circle 133 on Postpaid Card

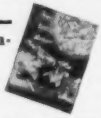
CUTS DEBURRING and CHAMFERING COSTS...

PINES TUBE AND ROD END-FINISHING MACHINE

- Fast, Easy to Operate—Clamps, Feeds, and Gauges Depth of Cut in Single Stroke.
- Interchangeable Tool Bits, Holders, Chuck Inserts.
- Combines Inside-Outside Deburring and Facing in Single Operation.
- Compact, Portable—Takes up Small Space.
- Other Models Available for Work up to 5" Diameter.
- Automatic Air-Operated Units and Specials to Suit Higher Production Needs.

(Above) Model 600 Machine has 8-speed step sheaves (760 to 3920 RPM), pivoting stock stop. Clamps and feeds work to rotating cutters. Capacity up to 2" O.D. Average production: 600-800 tube ends per hour.

WRITE FOR COMPLETE DATA— New Catalog illustrates cost-cutting features, gives production data and complete specifications.



PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery | 644 WALNUT • AURORA, ILLINOIS

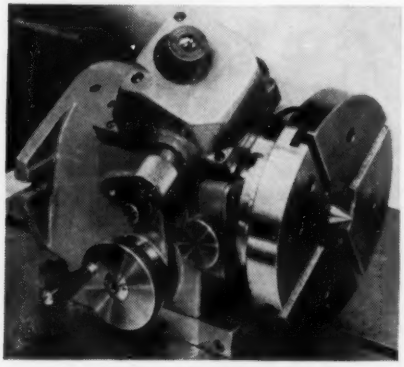
PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

For more data circle 490 on Postpaid Card

OPTICAL DIVIDING HEAD

The George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y., has announced the OMT-Optical Dividing Head which has been primarily designed for inspection and light machining purposes. This Model OW12-OMT Optical Dividing Head is of extremely robust construction, the spindle being mounted in solid bearings, and embodies a non-deflecting clamping device. The back face of the dividing head is scraped square to the base and the axis of the spindle so that the head may be used with the axis of the spindle in the vertical or horizontal plane. Direct readings to 2 seconds of arc are accomplished by employing a micrometer eyepiece, with is illuminated by a low voltage bulb. For coarse adjustment, an external scale ring is provided close to the eyepiece. Rotation is effected by a handwheel through a worm and worm wheel, which can be disengaged for rapid positioning simply by movement of a lever. A positive non-deflecting looking device is operated by a knurled knob adjacent to the eyepiece. Work can be held either in collets or between centers and a faceplate is provided. Tailstock and a baseplate unit are standard equipment.

For more data circle 134 on Postpaid Card



George Scherr OMT-Optical Dividing Head

For Precision Checking of

USE SUNDSTRAND BENCH CENTERS

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

Complete Range as Follows:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 594.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

For more data circle 491 on Postpaid Card

new shop equipment . . .

VERTICAL PNEUMATIC SANDER

The Airetool Manufacturing Co., Springfield, Ohio, has announced the development of its Model 500-V Vertical Pneumatic Sander. This sander has been particularly designed for feather edge sanding and fine metal finishing. It has been developed for use in aircraft plants, foundries, steel mills, automotive manufacturers tool and die shops, and fabricating plants.

Airetool 500-V Vertical Pneumatic Sander

This lightweight sander makes fine finishing of either flat or contour surfaces easy. The long handles provide for quick manipulation and feather touch accuracy. Its smooth running pneumatic motor is quiet and free from vibration, and the thumb operated throttle assures positive control. Double lugs permit easy, instantaneous on-off movement using the thumb.

The Model 500-V can be obtained with motors operating at speeds of 2,300, 3,000 or 4,000 r.p.m.

For more data circle 135 on Postpaid Card

B&W SAMPLER

Brings Typical Spot & Center Drills and Adapters for you to shop-test without obligation

Ask for it

You can't fully appreciate the convenience, low cost and time saving advantages of these tools until you try them. That's why we're making it easy for you to do so — at your convenience. Return the sampler after your evaluation — using label and postage enclosed. Any tools you may wish to retain will be billed later.

B & W PRECISION PRODUCTS CO.

11393 E. Eight Mile Road, P. O. Box 3865
Detroit 5, Michigan, Engineering Dept. M.

For more data circle 492 on Postpaid Card

DOUBLE ACTING AIR CYLINDER

A line of double acting air cylinders has been announced by Mead Specialties Co., 4114 North Knox Ave., Dept. AC-42, Chicago 41, Ill. These cylinders are of heavy construction, accurate design and fine materials.

At present there are four models in four sizes, making a total of 16 cylinders. They are horizontal, vertical, pivot or face mounted, and the bores are 1½, 2½, 3¼ and 4 inches. The basic cylinders are all alike, but the mountings are interchangeable.

All models have internal cushioning at both ends, but can be converted to non-cushioned cylinders by removing the cushion adjustment screws. Special plugs in the cushion vents can be used to produce a semi-cushioned effect—just enough to prevent slamming.

High tensile end caps, C1141 hard chromed rams provide smooth action and long life. The cylinders have been built for a working pressure of 250 p.s.i. with ample margin for safety.

For more data circle 136 on Postpaid Card

Four models of Mead Double Acting Cylinders

CMD
LEADER PIN LUBE

PROTECTS –
- LEADER PINS
- GUIDE POSTS

OFFERS –
1. GREATER OILINESS
2. MORE ADHESIVENESS
3. HIGHER FILM STRENGTH

PREVENTS –
- WEAR
- GALLING
- SCORING
- FREEZING

TEST RESULTS

1¾" Pin Size .001"—.005" Fit Tolerance
312 Strokes Per Minute.

One normal application was made of CMD LEADER PIN LUBE and test was made to destruction. *More than 2,500,000 strokes recorded before pin seized for lack of lubrication.*

TRIAL OFFER

These kind of results prove CMD LEADER PIN LUBE gives EXTRA lubrication . . . adds a SAFETY MARGIN.

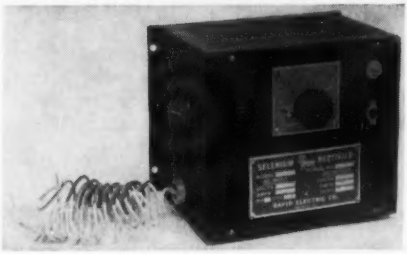
Ask for a TRIAL ORDER of a 1 lb. can for your use. Furnish complete information on your purchase order or letter. Sent prepaid at a cost of $1.00.

Leader Pin Lube
CHICAGO MANUFACTURING AND DISTRIBUTING CO.
1910 WEST 46TH STREET • CHICAGO 9, ILLINOIS
For more data circle 493 on Postpaid Card

new shop equipment . . .

RECTIFIER FOR MAGNETIC CHUCKS

Rapid Electric Co., 2877 Middletown Rd., Bronx 61, N. Y., is marketing selenium rectifiers for magnetic chucks. Available in ten models, from 50 to 1,600 watts, these compact rectifiers are economical and dependable sources of d.c. voltage.



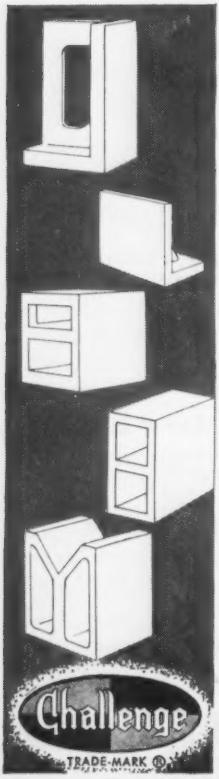
Rapid Electric Selenium Rectifier

The selenium rectifier stacks have been designed for full wave rectification and are conservatively rated. The selenium plates used in the construction of the stacks are pretested electrically prior to assembly. This insures the use of balanced full wave stacks. All stacks are coated for positive protection against corrosion fumes and extreme adverse atmospheric conditions. Vacuum or air cleaning is the only required maintenance.

Selenium rectifiers offer instant starting and instant d.c. power. There is no problem of filament warmup.

For more data circle 137 on Postpaid Card

For MORE ACCURATE MACHINE SET-UPS



CHALLENGE

ANGLE PLATES • ANGLE IRONS
BOX ANGLES • V-BLOCKS
and BOX PARALLELS

These Challenge products provide a practical means of clamping and holding work for precise measurement and machining. Many machinists also use these units not only as a base for their precision fixtures but as a part of the fixture itself — thus increasing accuracy while eliminating a step of manufacture.

The precision that is part of every Challenge unit extends all the way up to 10 x 20 ft. Surface Plates. Whatever your precision problem may be—standard or special sizes —Challenge has the best answer for you. See the complete line by writing for the latest Challenge Precision Catalog or ask your Industrial Distributor.

SE-117

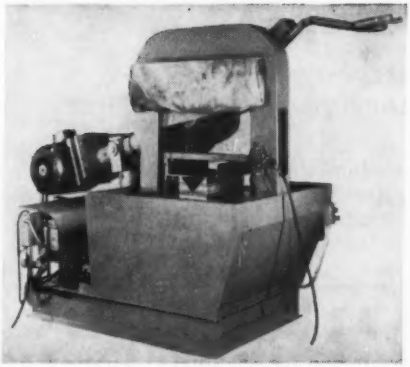
THE CHALLENGE MACHINERY CO.
Grand Haven, Mich. Dept. MM8-8

For more data circle 494 on Postpaid Card

WET OR DRY ABRASIVE CUTTING UNIT

Wallace Supplies Manufacturing Co., 1304 Diversey Parkway, Chicago 14, Ill., has introduced a wet or dry abrasive cutting unit known as the Wallace "See-Saw." This unique machine can travel over a prescribed distance steadily or, should the operator choose, intermittently at any desirable frequency of reciprocation.

Here the user has, at his finger tips, a machine powered by three separate motors. One rotates the cutting wheel and is always functioning during a cut. A second motor powers the forward and back travel of the cutting head. Handling of this motor is the function of a pushbutton control on the right handle. A third motor supplies more than 35 gallons of cutting compound to the cutting area. This third motor is controlled by a push-button on the left handle of the unit.



Wallace "See-Saw" Abrasive Cutting Unit

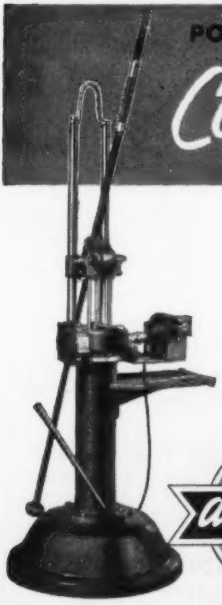
Pressure down (or cutting pressure) is directed by the two hands of the operator. Thus, this unit enables the user to follow the contour of such sections as he may deem best.

For more data circle 138 on Postpaid Card

POWER SCRAPER

Cuts Production Costs...

... 5 HOUR JOB CUT TO 50 MINUTES



One manufacturer was scraping flat pieces measuring 18 by 24 inches . . . each piece requiring 5 hours to scrape by hand. An Anderson Power Scraper cut scraping time to 50 minutes! That meant a substantial saving in production costs and another happy Anderson customer. Let us help you estimate how much this portable, easy-to-use power scraper will save for you.

Today, write for Bulletin 8-22

Anderson

ANDERSON BROS. MFG. CO., Rockford, Ill.

For more data circle 495 on Postpaid Card

SEMI-AUTOMATIC LAPPING MACHINE

A 24 inch semi-automatic lapping machine has been developed by Taft-Peirce Manufacturing Co., Woonsocket, R. I., which can deliver flatness to less than one light band (0.00011 inch) and a surface finish as low as 1 miroinch r.m.s. It features a fully automatic work cycle, including the application of the lapping compound, a variable speed drive for selecting best lapping rate and specially designed magnetic truing rings which maintain continuous plate flatness while the machine is in operation.

Taft-Peirce Semi-Automatic Lapping Machine

This semi-automatic lapper has been designed primarily for lapping small parts in production lots, but can accommodate any large casting or similar part that will fit in any one of the truing rings, which have an 8⅞ inch inside diameter. Small parts are placed inside the truing ring using

JIG BORING
and
Large Precision Machining
Done to your specifications
We have 22 Jig Borers
KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 496 on Postpaid Card

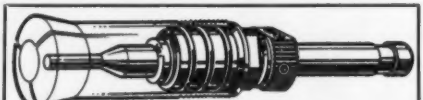
MONEY SAVING . . .
TIME SAVING . . .
NEW

DONAU Fully Automatic
Rack Milling Machine

- Variable Hydraulic feed
- Built-in high precision leadscrew
- Hardened and ground gears
- Rapid power traverse
- Swiveling saddle and milling head for cutting right and left teeth
- Automatic cycle control cap. up to 31½" (optional)

Max. Pitch 4.2, Max. Length 71", Table Size 14"x78"
INDEX INDUSTRIAL CORPORATION
150 Broadway • New York • BEekman 3-4540

For more data circle 497 on Postpaid Card



NEW! Self-Centering 5C Collet Stop
Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.
Write for Bulletin.
BYCO INDUSTRIES
2200 Snelling Ave. Minneapolis 4, Minn.

For more data circle 498 on Postpaid Card

masonite separators, where they are held in contact for lapping by weight plates. These masonite separator plates can be cut, drilled or otherwise shaped to accommodate parts of any outline, thus providing extreme versatility in the type of parts which can be handled.

For more data circle 139 on Postpaid Card

★ modern machine shop ★

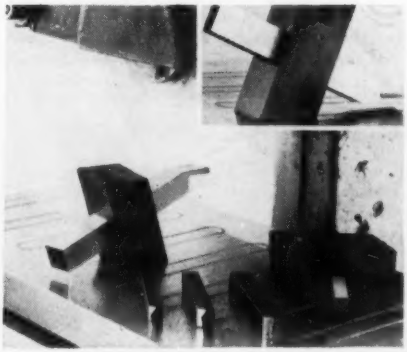
TOOL GRINDING FIXTURE

R. L. Spellman Manufacturing Co., Urbana, Ohio, has introduced a line of tool grinding fixtures for toolmakers, machinists and tool cribs.

These fixtures are to be used with a surface grinder. The bit is locked by a set screw in a square hole in the fixture and the fixture is placed on the magnetic chuck of the surface grinder.

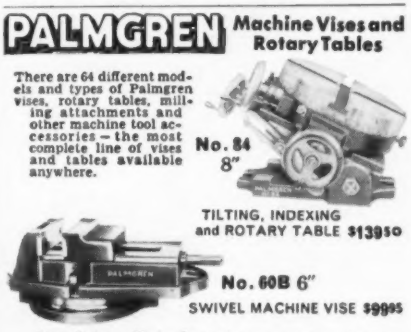
The first of these tool grinding fixtures (No. 12-L) is used to grind a lathe cut-off or parting tool. Both ends of the fixture, which contacts the magnetic chuck, have compound angles accurately ground, to give correct clearances to the cut-off tool. With this fixture, anyone can grind or sharpen an accurate cut-off tool; no skilled labor is required. The fixture takes all size bits, ½ inch or smaller.

For more data circle 140 on Postpaid Card



R. L. Spellman Tool Grinding Fixture

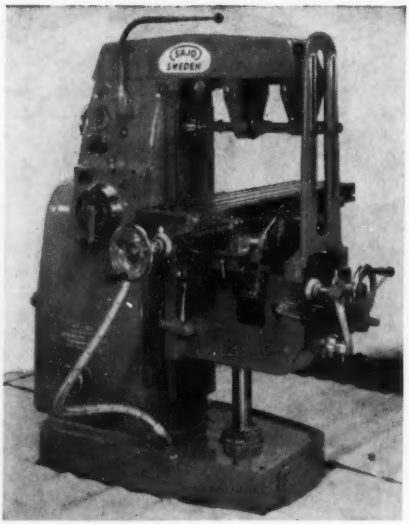
For more data circle 499 on Postpaid Card


PALMGREN
Machine Vises and Rotary Tables
There are 64 different models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories — the most complete line of vises and tables available anywhere.
No. 84
8"
TILTING, INDEXING and ROTARY TABLE $139.50
No. 60B 6"
SWIVEL MACHINE VISE $99.95
Used in all industries — everywhere.
Get this FREE Catalog NOW
No. 2B 4"
HEAVY DUTY ANGLE VISE
$149.95
CHICAGO TOOL AND ENGINEERING CO.
8399 S. Chicago Ave., Chicago 17, Ill.

For more data circle 500 on Postpaid Card

HORIZONTAL MILLER

Austin Industrial Corp., 76-H Mamaroneck Ave., White Plains, N. Y., has announced the No. 2 Light Type Horizontal Milling Machine, the Sajo Model 53A, which features: a table working surface of 43¼ by 10¼ inches; longitudinal power feed of 28 inches; power feeds and power rapid traverse in three directions; No. 40 Taper American Standard Spindle; 5 h.p. motor drive; dial selection of speeds and feeds; one-shot lubrication; and a backlash eliminator.

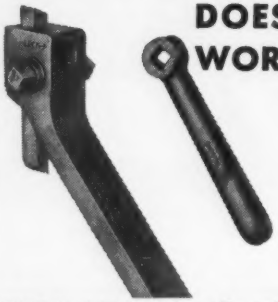


Sajo Model 53A Horizontal Milling Machine

The Model 53A, available in both plain and universal models, embodies the Sajo spindle employing double-row staggered cylindrical roller bearing for radial load and ball thrust bearings for axial load.

For more data circle 141 on Postpaid Card

ONE TOOL HOLDER DOES THE WORK OF TEN



ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading... Ideal for carbide tools . . .

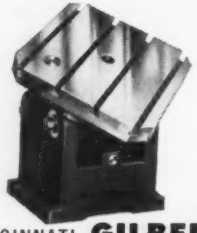
Bit sizes: ¼", 5/16", ⅜", 7/16", ½", 5/8"

Furnished with Cobalt Bits

ACME TOOL CORP.

73 W. Broadway New York 7, N. Y.

For more data circle 501 on Postpaid Card



SAVE 50% of positioning time

With one set-up on a Cincinnati Gilbert universal table, you can drill at any angle up to 90° on 5 sides of a cube. Provides maximum support of work piece, assures rigidity and accuracy. Table sizes: 22" and 27" square, 22" high. For complete details and specs, ask for Bulletin 850.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle 502 on Postpaid Card

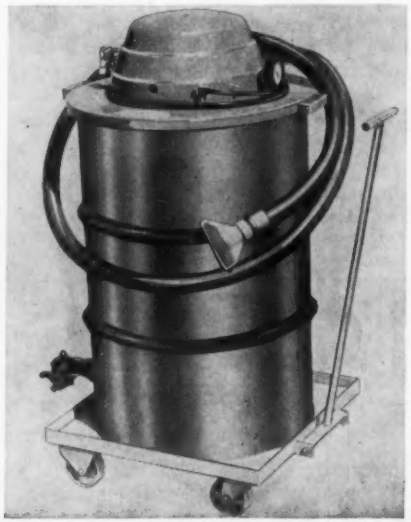
DRUM TOP SUMP CLEANER IS IDEAL FOR USE IN SMALLER SHOPS

Coolant Equipment Corp., Verona 3, Wis., has announced that lower machine tool maintenance costs and mess-free sump cleaning are obtained through the use of the Model DLO Drum Top Sump Cleaner. Vacuums up to 275 inches water remove sludge, chips, coolant and oil from machine tool sumps directly into 55 gallon drums. Hand bailing and pump replacement are eliminated.

The Model DLO operates on single phase electrical circuits, has a positive acting overfill control and vacuum relief valve. The self-sealing lid fits standard 55 gallon drums.

This compact unit is ideal for use in smaller shops or as an auxiliary cleaner in larger plants where used oil, coolant, chips and sludge are disposed of in 55 gallon drums.

For more data circle 142 on Postpaid Card



Coolant Model DLO Drum Top Sump Cleaner

HIGH SPEED
FLAT TWISTED AND ROLLED SECTION
DRILLS

Unexcelled in Quality and Performance since 1903!

HI-DUTY *Flat-Twisted* and *Rolled Section* Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from 1/2" to 3 1/4" and larger. Milled type drills are also available—from 1/64" to 1/2" diameter. Hi-Duty means long lasting economical service!

SPECIAL DRILLS

We manufacture a large variety of *special* types of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY...

We can make immediate shipment from stock on many special drills! *Contact your Industrial Supplier or write today for Catalog and Price List.*

HI-DUTY DRILL WORKS

FLEETWOOD, PENNSYLVANIA

For more data circle 503 on Postpaid Card

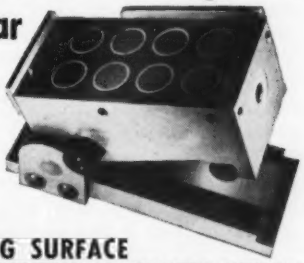
LOW COST 5" Magnetic Sine Bar

•

ONLY $149.95

•

MODEL #1805M 5" x 3"



WORKING SURFACE ON PERMANENT MAGNETIC CHUCK

Positive locking provides rigid set-up for light machining operations. End and side plates allow accurate locating of pieces on magnetic chuck making it a versatile, low cost fixture. Ideal for production, inspection or tool room.

OTHER MODELS include 5" and 10" sine bars and plates, single and compound angles, plain and magnetic. Solid oak cases available.

The complete Bald Eagle line starts at $21.75, F.O.B. St. Paul. Order your sine bar or plate from your dealer or direct.

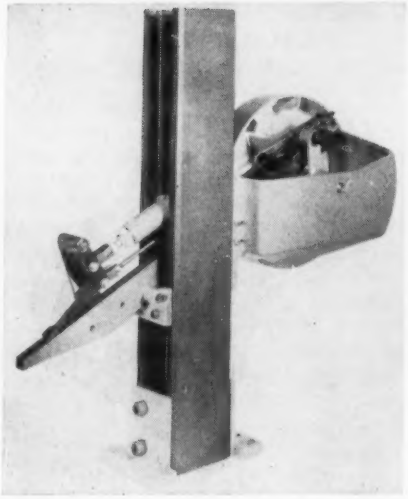
BALD EAGLE PRODUCTS DIV.
Bald Eagle Corporation
356 Cedar Street, St. Paul 1, Minnesota

For more data circle 504 on Postpaid Card

AIR OPERATED PARTS FEEDER

A compact, combination parts feeder and escapement unit, designed for placing a broad range of small parts automatically, has been announced by Dixon Automatic Tool, Inc., 2314 Twenty-third Ave., Rockford, Ill. The unit, sold either fully tooled or untooled, includes feeder, feed track, escapement mechanism and a twin-rail mounting column. Compactness and simplicity are major features of the unit which permit easy application and installation. Maximum overall width is only 6 inches, which conserves space and permits close nesting of multiple units.

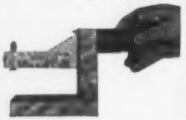
Parts are controlled and fed by the action of a single dual purpose air cylinder, connected on one end to a positive acting escapement mechanism, and on the other end to a feeder drum operating arm. The feeder operating arm is equipped with a one way clutch of wrapped spring design, which provides intermittent rotation of the vertically mounted feeder drum. The feeder housing has 180 cubic inch capacity for piece parts when filled to proper level. Nine integral lugs, cast on the inside of the rotating drum, deliver the piece parts to a metal loading tray. The tray has been designed so that it can be easily cut or shaped to properly guide piece parts into machined grooves of the feed track. A spring steel finger, attached to the upper end of the operating rod, automatically discards misoriented parts. If necessary, the wiper finger may be easily cut or formed to suit the shape of parts.



Dixon Automatic Air Operated Parts Feeder

The rectangular feed track is supplied in several widths, either completely tooled or in blank form, so that it may be readily machined by the user to suit individual piece part requirements.

For more data circle 143 on Postpaid Card

New 1958 Model "SS"
RADIUS DRESSER

OUTPERFORMS THEM ALL
Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations.
Low Price $124.50 with Diamond
Write for free illustrated folder.
SOMERSET TOOL CO.
320 Virginia St. Hillside, N. J.

For more data circle 505 on Postpaid Card

CAMS
MADE TO YOUR SPECIFICATIONS
—Except Screw Machine Cams—
Design Assistance Offered
KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 506 on Postpaid Card

many titles ...a common function...that concerns you!

Whatever their titles, these men have a common function in plant operation that is important to you. They... and thousands like them... are all readers of MODERN MACHINE SHOP, all specify, buy and influence buying of your products and services.

The "heart" of MODERN MACHINE SHOP circulation is to production men, even in the small plants where presidents, vice-presidents and general managers function as production men.

MODERN MACHINE SHOP does a better job of reaching these men at lowest cost because it alone, of all metalworking publications, offers:

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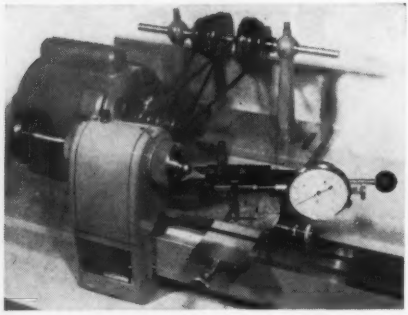

Derbyshire Radius Turning Attachment

RADIUS TURNING ATTACHMENT FOR LATHES

F. W. Derbyshire, Inc., 157 High St., Waltham, Mass., has introduced a radius turning attachment which was developed to turn concave and convex radii and which can be used in the manufacture of contact lenses. With the company's Model A Lathe, which has a ½ inch capacity through the headstock, a piece can be turned to any radius that is needed. An off center radius can be adjusted to get the desired shape to fit the true shape of the eye. By using a step chuck, a radius of up to ¾ inch in diameter can be turned.

An indicator is available, in either 0.001 or 0.0001 or in millimeters, to provide the operator with the adjustment that he desires.

For more data circle 144 on Postpaid Card

★ modern machine shop ★

SPINDLE FOR ELECTROLYTIC METAL REMOVAL

Super Precision Spindles, motorized or independent drive, are now available from The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, to handle 1,000 amps. The illustration shows the latest design of a 5 h.p., 1,800/3,600 r.p.m. with slip ring and isolation for 1,000 amps. and suitable for 3,000 amps. in the process of electrolytic metal removal.

The spindle nose will serve a variety of wheel holders for straight or recessed wheels. Other models are available for 75, 100 and 350 amps.

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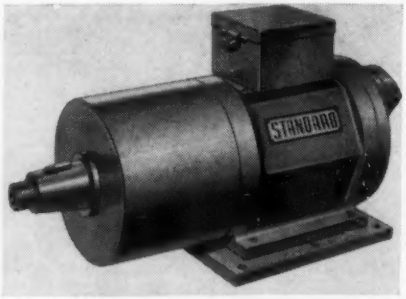

Super Precision Spindle handles 1,000 amps.

For Your Convenience . . .

the "Where to Get It" section of MODERN MACHINE SHOP provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 214, 216, 218 and 220.)

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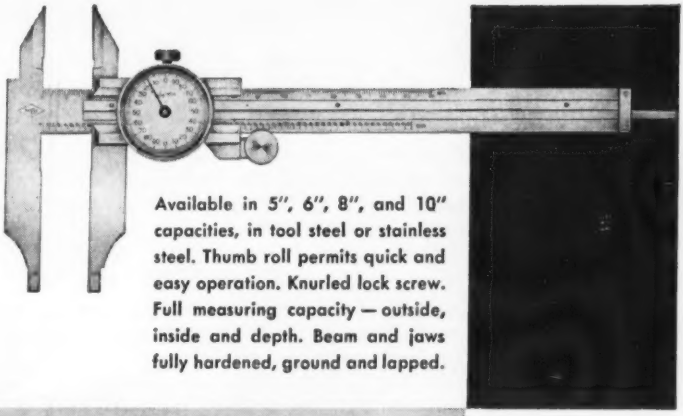
431 MAIN STREET • CINCINATI 2, OHIO

DIAL VERNIER CALIPERS



With Dial Indicator Reading Directly In .001" Eliminates Costly Reading Errors

Available in 5", 6", 8", and 10" capacities, in tool steel or stainless steel. Thumb roll permits quick and easy operation. Knurled lock screw. Full measuring capacity — outside, inside and depth. Beam and jaws fully hardened, ground and lapped.

KEYLESS DRILL CHUCKS

CAPACITIES UP TO 5/8"

ALL OPERATING PARTS HARDENED AND INTERCHANGEABLE

SELF-TIGHTENING:

Tighten the easy-grip sleeve by hand and the tool is chucked. Drill shank does not slip since the gripping power of the chuck increases with the load.

QUICK CHANGE OF TOOLS:

Built-in ball bearing; drill chuck therefore easily opened by hand despite tremendous gripping power.

Tested For Performance To American Standards

ALSO AVAILABLE:

- **Multi-Purpose Vises**
- **Reversible Safety Tapping Attachments**
- **Quick Change Chucks & Collets**

Immediate Delivery From N. Y. Stock

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Our Headquarters in New York City

MBI

M. B. I. export & import ltd.

A Division of Machinery Builders Inc.
475 Grand Concourse, Bronx 51, New York
Phone: MOtt Haven 5-0900

"Over 25 years experience in designing and building machinery"

Write for Descriptive Booklet and prices.

For more data circle 508 on Postpaid Card

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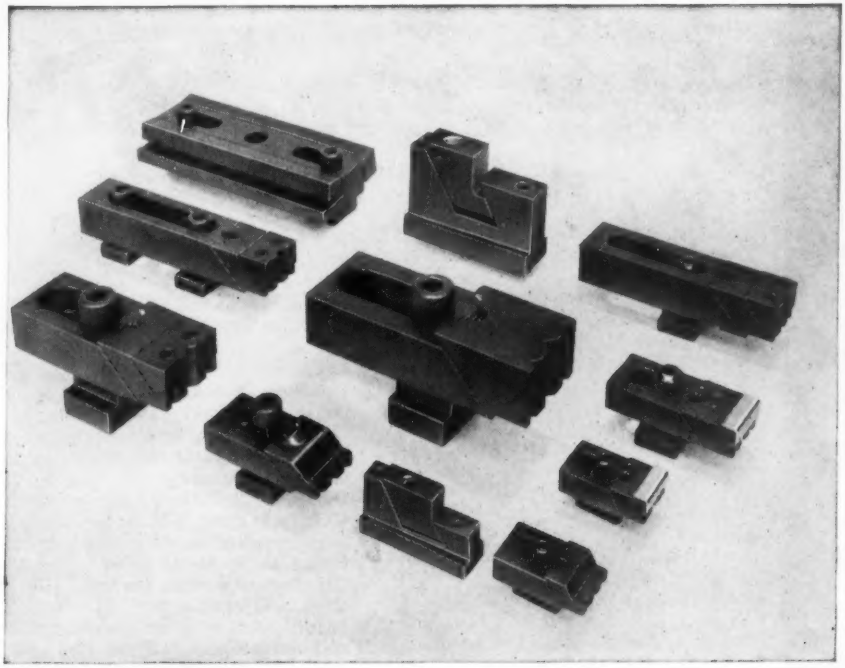
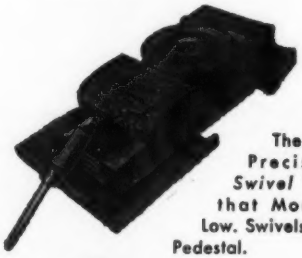


Where you can get . . .

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.



The *only* Precision *Swivel* Vise that Mounts Low. Swivels. No Pedestal.

Faster Set-up with any of the 5 Models of J & S Jaw Clamps — one adjusting screw has a holding force of 2½ tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems—no interference with measuring tool readings.

See your industrial distributor or write today for free literature.

WHEEL DRESSERS J&S TOOL CO. INC. JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES **CLAMPCUT** ONE EACH

J & S TOOL CO., INC. | **871 DORSA AVE. LIVINGSTON, NEW JERSEY**

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NEW! LARGER CAPACITY (6" WHEEL) PROFILE GRINDER

by Boyar-Schultz

For Heavier and Larger Work

Long known as a time saver in Tool & Die Shops, Boyar-Schultz No. 2 Profile Grinder is now available in a new larger capacity size. With its 6-inch diameter wheel capacity this new Profile Grinder will finish large dies and other similar contour grinding with the rapid efficiency so well known in the smaller wheel capacity models.

The new size is made in the Single Spindle model, with a bigger table to accommodate larger and heavier work. Also available with Standard Upper Spindle.

With Dual Spindle

With Dust Collector

BOYAR-SCHULTZ
CORPORATION
2020 South 25th Avenue, Dept. A-K • Broadview, Illinois

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Removes Metallic Chips and Abrasive Particles

Delpark Gravity **CLARIFICATION**

For CUTTING and GRINDING OILS and WATER BASE COOLANTS

The Delpark Gravity Clarification Unit handles direct flow of coolants with controlled velocity to permit metallic chips and abrasive particles to settle out.

Minimum turbulence permits more positive gravity action in the settling of particles. Attains a clarifying efficiency of 75 to 90% depending on the type of solids to be removed.

Heavy duty chain conveyor flights remove settled particles to sludge box. Unit is completely automatic—requires only removal of sludge deposited in tote box.

Flow capacities range from 20 to 1000 g.p.m. Tank capacities from 140 to 7,600 gallons.

Write for more complete details in Delpark's new Gravity Clarification Unit 4-page folder. There's a Delpark field engineer near you to supply immediate information.

Delpark

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Delpark Division
LEBANON, INDIANA
Subsidiary of Commercial Filters Corporation

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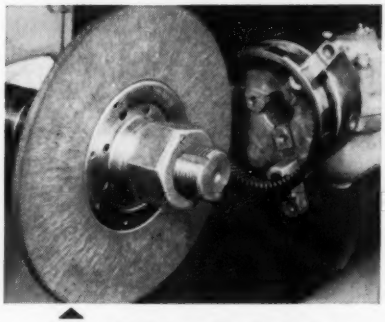
a new concept in power brushing tools



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How TY® BRUSHES will significantly cut your finishing costs

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Where rotary files, abrasive stones or belts, tumbling and shot blasting equipment have been used—TY Brushing Methods now do many of these jobs *better . . . at significantly less cost.*

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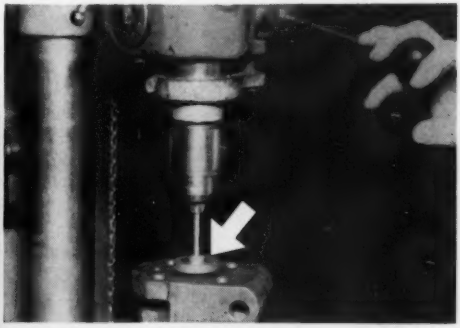

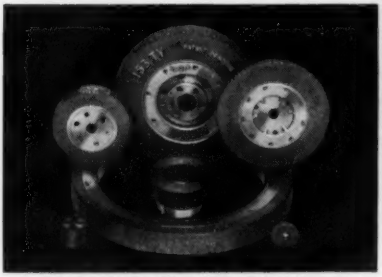

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Osborn Brushes

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BRUSHING MACHINES • FOUNDRY PRODUCTION MACHINERY

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GUSHER Coolant Pumps

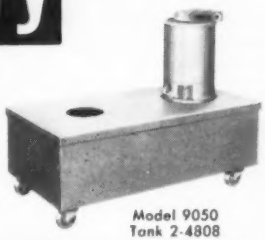
There is a type and model of Ruthman Gusher Coolant Pump to fit virtually every requirement; Immersed Type, Pipe Connected, Flange Mounted, and Shaft or Pulley Driven. Capacities from 1/30 to 7½ H.P.

Model UL

PUMP for every

GUSHER Tank Units

Gusher Tank Unit Coolant Pumps can either be mounted permanently on metal-cutting machines without built in coolant tank, or can be equipped with casters for complete portability. Capacities 1/30 to 7½ H.P.



Model 9050
Tank 2-4808

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RUMACO Seal Pump

Precision built, seal type Rumaco Pumps offer you the same advantages built into all Ruthman Pumps. Rumaco pumps are adaptable to a wide variety of applications. Capacities 1/10 to 7½ H.P.

Model 5-S

Turn to Ruthman for Any Centrifugal Pump Problem

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THE Ruthman MACHINERY CO.

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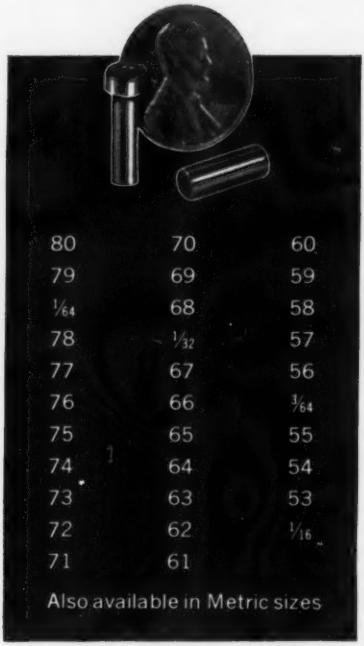

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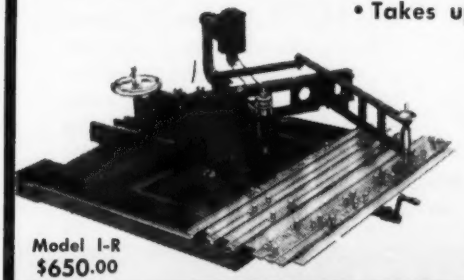

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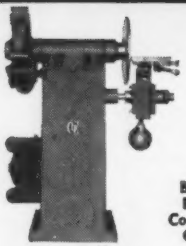

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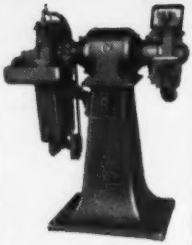

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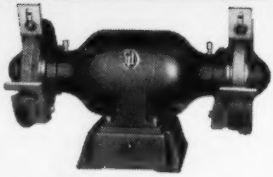

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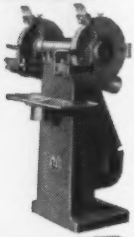

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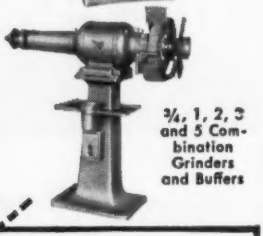

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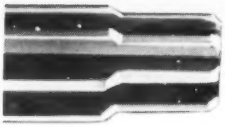

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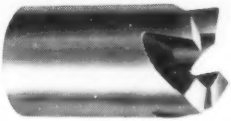
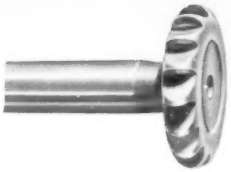


Internal form relief grinding



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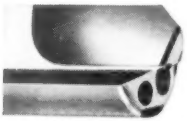
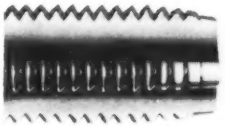
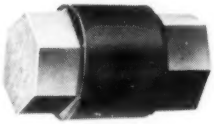
Form relieving step drills



Form relieving gun drills



Sharpen tap chamfers with cam relief



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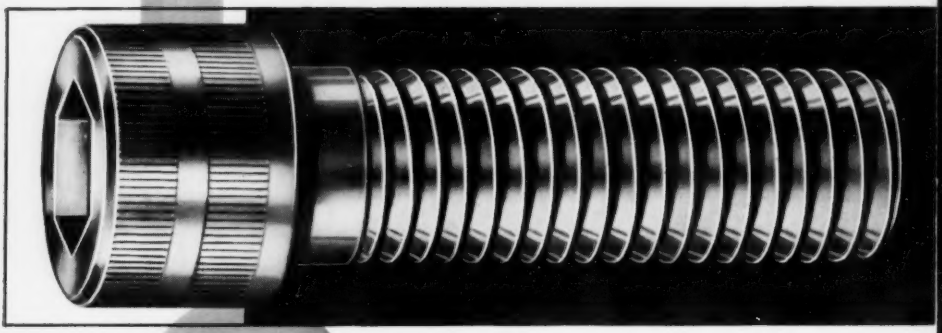

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